

Kinematics Teaching Method

BACKGROUND OF THE INVENTION

The research done during the past twenty years in the areas of arts education, mathematics and cognitive development has demonstrated several principles regarding how to best facilitate improvements in academic achievement. The first is that learning that is tightly connected to individuals' life results in an increased motivation for learning. The second is that learning in the abstract delays learning as opposed to learning through concrete mediums. The third is that learning through one's most prominent intelligence enhances academic achievement.

Current systems rely heavily on visual stimuli (see Claude C. Couvillion; and Barry J. French; and Ann Edwards & Karen Goldberg) and external stimuli (see Michael Matias Merzenich; Barry J. French; and Impulse Technology LTD.). Some of the current systems are used for purposes other than enhancing academic achievement (see Michael Matias Merzenich). The systems that are aimed at enhancing academic achievement, while appropriate for some learners, exclude most because of the bias that is built into these systems.

SUMMARY OF THE INVENTION

The present invention is teaching method incorporating the following:

- a) expressing verbally: ideas, understandings, emotions and thoughts related to the curriculum; and
- b) creating/performing a dance that expresses the ideas discussed in (a).
- c) expressing new and explored knowledge in writing.

The integration of both mediums (the verbal and physical modes) has been found to help many students develop meaningful understandings of mathematics, reading, writing and language arts curriculum.

This process has been found to help many students and especially those who come from disadvantage neighborhoods, those diagnosed with Dyslexia, Hyper Activity Disorder and Attention Deficit Disorder, male and females, and those for whom English is a second language. This methodology has been tested and found to have significant positive effects on the academic achievement (as measured on written tests) of elementary grade children.

The present invention is based upon incorporating the personal experience of the learner and facilitating it by exploring the curriculum by verbally expressing ideas, understanding, emotions and thoughts related to the curriculum. A dance is then created and/or performed that expresses the ideas,

understanding, emotions and thoughts. New and explored knowledge is expressed in writing. The present invention builds on all three of these principles to enhance academic achievement.

The present invention was designed to take into consideration tested research principles together with learners' potential barriers for learning. As such, the present invention has no biases that could prevent learners from building on their maximum cognitive potential. The present invention builds on stimulating the kinesthetic intelligence (which is inherent to everyone because without movement there is no life) to develop new knowledge that is then explored in other methods (such as those relying on audio, visual or tactile senses).

The implementation of the present invention is such that learners' potential barriers for learning (such as weak audio, visual or tactile senses) or neurological barriers (such as Dyslexia, Hyper Activity Disorder or Attention Deficit Disorder) can be overcome to help students demonstrate their best performance on written tests. Stimulation of the kinesthetic intelligence is conducted first. Second to the instruction are verbal analysis and visual observations, and third is the writing and reading component of teaching.

The present invention not only helps most children improve their achievement on mathematics tests by two letter grades, but also allows most children to surpass the national achievement average on mathematics tests by 15 points, or 15 percent. Data demonstrates that all of the following groups benefit greatly from learning through the present invention:

- 1) English as second language students;
- 2) Students entitled to reduced or free lunch;
- 3) Males;
- 4) Females;
- 5) Gifted;
- 6) Students with disabilities

Research also demonstrates that the present invention helps increase both students' and teachers' motivation towards learning and teaching. The present invention differs from all current systems in that it is a multi-layer approach to teaching that begins with, and builds on, stimulating the kinesthetic intelligence for the purpose of enhancing academic achievement.

BRIEF DESCRIPTION OF THE FIGURES

Figure 1 shows a flow chart of the present invention.

DETAILED DESCRIPTION OF THE INVENTION

Correct implementation of the present invention requires a ten-step process. Skipping a step will present the students from reaching their highest possible academic achievement. The ten-step process is as follows, as shown in Figure.

Step #1:

All instruction begins with a verbal explanation of the curriculum that is to be taught/explored that session. The use of the blackboard or printed material is recommended only after students begin to dance.

Step #2:

The teacher helps students begin to develop a "shape bank" and "transition bank." A shape bank is developed by students creating shapes that they like with their bodies. The shapes can be large or small, tall or short, wide or narrow, on one foot, sitting, etc. These shapes should be written (documented) on paper by students, so that there is a record of the shapes for later use.

The documentation of the shapes on paper is crucial for helping students develop a visual memory of three-dimensional shapes in a two dimensional mode (paper). In addition, this method helps instill confidence in students' own writing abilities and skills.

Step #3:

The "transition bank" is developed by students deciding on ways to connect one shape to another. Transitions can be distinguished by their pace (such fast or slow) and/or by their path in space such (as a curved or shortest path, a figure eight or a straight line). The transitions should be documented on paper by the students, so that there is a record of the transition for later use.

Each transition should have its own sign and students should be able to recognize those signs and explain the connection between the visual shape of the sign and what it symbolizes. This is necessary so that students begin to develop understanding the relationship between how shapes look and what they mean. An example for the sign representing a sharp transition could be represented as



The sign resembles a sharp transition in that its own writing requires a sharp action on the paper. An example for a curved transition could be represented as



The sign resembles a curved transition in that its own writing requires the creation of an arch on the paper.

Step #4:

The teacher presents the information or problem and frames a question to be explored both kinesthetically (by students putting together a dance phrase) and by writing information on paper. The framing of the question must include specific guidelines to which the dance should adhere. For example, when teaching students the properties of a line segment, the guidelines of the dance must refer to the floor path of the dance. The framing of the guideline would be as follows:

Create a dance that begins in one point on the floor and continues in a straight line to a different defined ending point. The distance between these two points should be the shortest possible. Make sure that the way you dance your line segment dance represents this property of a line segment.

The teaching of one-thirds is another example. The teacher asks students to create a dance that is 21 counts long. Then instructs students to divide the total number of counts to three sections, so all three sections has equal number of counts. The teacher facilitates a discussion about the meaning of each section of the dance, i.e., "dividing" the dance this way creates three thirds. The teacher can then ask students to dance any one third of their dance, any two thirds of their dance, or all three thirds of their dance. The teacher should continue by asking how many counts are represented in each third of the dance. In between all of these instructions students should be allowed to dance before they say the answers aloud.

Step #5:

The teacher assigns students to work either alone or in groups of two, three or four. It should be emphasized that all present invention work requires both kinesthetic movements as well as written documentation on paper and verbal explanation of one's work.

Step #6:

The teacher allocates time for students to work, during which time the teacher moves among the groups and makes him or herself available to answer questions or provide clarification. It is important that if students have questions they are to frame those questions in complete sentences, and they are to be encouraged to help each other to arrive at a complete coherent question.

Step #7:

The teacher calls for everyone's attention and asks each group to summarize its work process, new information they arrived at, conclusions, or what they might have learned from each other.

Step #8:

Teacher gives groups another five minutes to prepare their group demonstration to be presented both kinesthetically as well as in writing.

Step #9:

Each group demonstrates their work (kinesthetic, written and oral explanation) to the entire class. At the end of each demonstration the group verbally explains their process and a discussion is facilitated between the presenting group and the "audience" (their peers) with the purpose of clarifying and answering questions the "audience" might have.

Step #10:

The teacher concludes the session by explaining the homework and providing an example of how the present invention can be used at home to further the learning.

A successful implementation of the present invention requires not only understanding the process of implementing the present invention, but also understanding the subject matter taught. This means familiarizing oneself with the goals and objectives of the subject taught as defined by a State Department of Education.

Implementing the present requires understanding that the process takes time and that it has a particular structure that should be followed carefully, namely:

- 1) Verbal explanation of the activity and what should be done.
- 2) Demonstration of the kinesthetic principles students should use in their kinesthetic representations (dances).
- 3) Provide the students with enough time to listen and read the activity and design a solution process.
- 4) Remind the students that documenting their kinesthetic process on paper is essential for their success.
- 5) Encourage the students to build on their own thoughts, ideas, imagination and experiences when developing the "shape and transition bank."
- 6) Tell the students that meaningful learning requires continual repetition of kinesthetic phrases.
- 7) Explain to students that they should be able to visualize their own bodies moving in space before they perform their kinesthetic presentations.
- 8) Require the students to demonstrate their work as it is presented kinesthetically by performing it to the entire group as well as providing verbal

explanation of the work the movements represent.

- 9) Explain to the students that looking at their peer's work will enhance their own.
- 10) Encourage the students to work together when appropriate in order to arrive at better solutions (both kinesthetic and written).
- 11) Insist that the students' work also be done in writing, so that the kinesthetic process will lead to a coherent understanding of the problem and its solution and should be written down.

As shown in Figure 1, the process begins with step #1: teacher presents lessons' curriculum verbally. The process continues in progressive order steps #2 through #10. At any time after step #5 the teacher should (if necessary) include and use visual aids such as books, drawings, writing on the blackboard etc. to enhance the learning experience of students.

It is easy to fall into several traps when implementing the present invention. Make sure that you avoid the following mistakes that could delay your students' learning.

1. Never force all students to find one common movement to represent a letter.

For example, if you are teaching the alphabet letter O, do not expect it to be executed by all students raising both their hands over their heads, creating a round ball shape. Just as written repetition of an arbitrary letter shape does not help LD students remember the shape of that letter, an arbitrary and dictated choice of movements to represent a letter will similarly not be effective. For the choreographic process to be effective, each child must be given the freedom to decide what movements and body parts represent each letter, and to find a meaningful explanation or description to what that body part represents.

The teacher must ensure that the choices students make are meaningful to them by asking them to share the reasoning for their choices. If, for example the emotional aspect attached to each word or letter is weak (in the learning of letter shapes and spelling of words) often the learner will be unable to regenerate the letter shapes or sequence. If, after dancing the letter or the sequence of letters in a word several times, a student is not able to recall the shapes of letters and their sequence in a word, the teacher should assume that meaningful connections were not used. The learner is then asked to draw upon other experiences that are powerful and repeat the process with new dance moves.

2. Do not allow a student to use different representations for the same alphabet letter. (This would be relevant when teaching the alphabet.)

The goal in using kinesthetic memory is to have the brain associate one kinesthetic shape with one letter; having two or more body moves for one letter

could lead to confusion and frustration.

3. Do not assume responsibility for remembering each student's word associations, or signs for numbers, transitions or kinesthetic phrases.

At the beginning of the process, it should be made clear that the learners must find ways to remember their own work. The teacher reminds students that they can be more successful in this process if they record their kinesthetic movements on paper, drawing body shapes or sketching arrows to indicate direction and/or elevation of movements.

The following pages are a copy of the inventor's book, which focused on many details of the present invention.

The present invention is not limited to the embodiments described above, but encompasses any and all embodiments within the scope of the following claims.

Unlocking the Human Potential The Kinesthetic Approach for Academic Success and Happiness

—A Complete Parents and Teachers Guide for
Improving Students' Academic Performance
in
Mathematics, Reading, Writing, Spelling
as well as
Anger Management and Body Control

Over 500 activities for teaching mathematics, reading, writing, and spelling and with special chapters presenting a kinesthetic program for anger management and body control.

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PREFACE

This book was written after many years of looking for “the right answers” in the context of what in education works for children. Specifically I was and am concerned with how many children can not make the most of the education they receive in school. It seems, that while our children are very bright, we use inefficient instructional strategies that prevent rather than enhance their learning efforts.

Education is about learning, which I have always understood as the love for learning, wanting to know more and daring to ask questions. It is also about loving to work with new information, understanding how to sift through what is relevant and what is not, knowing how to work with other people, and developing skills for expressing oneself.

It seems that schools today focus on producing grades in a competitive environment. Hundreds and thousands of children are tested regularly in order to detect if they learn anything at school. The recent No Child Left Behind legislation has brought back an era where teachers are teaching to the test. Teachers are held accountable for students’ academic performance, and school’s funding depends greatly on the results of these tests.

In this environment there simply isn’t time for teachers to provide personal attention to students’ emotional, cognitive or social needs, which are important aspects that facilitate high academic achievement. The teaching to the test atmosphere has led teachers to overlook processes in favor of pushing the right answers. Developing analysis and critical thinking skills are very hard to find in today’s classroom.

The current academic environment favors those who don’t need much attention and those who can learn quickly from lectures and rote memorization exercises. This constitute about 15% of the entire student population. Neglected are everyone else who are creative, need time to focus on a process, those who work well in small groups, those having audio and visual processing issues or other barriers that prevent them from benefiting the most from their school day. The second group composes roughly eighty-five percent of our school children.

I discovered the love for learning not at school unfortunately, but during after school programs that allowed me to build on my strengths—creativity, ability to investigate in a variety of ways and express what I knew in formats that were not pre-defined. I could work well on my own and in small groups and always where there was no hysteric pressure of time. I have learned the art of working hard, persistence, listening, integrating information, diligence and respect for my teachers and peers during after school hours. Among the classes I was taking during the primary grades were drama, dance, painting and piano. I was titled gifted and was given ample opportunities to perform in formal ballet concerts as well as piano concerts. During the middle and high school years I added volunteering on an ambulance and tutoring two (then three) boys from a disadvantage family four times per week to my academic load.

I suffered at school. My teachers wanted to box my thought processes and responses into pre-defined formats. I was given little time to answer ample questions on written tests. This had always made me feel under pressure and competition. To this day, I reject that notion of education. People who need structure might find this type of education comforting, but creative and energetic people find this approach boring, dull, depressing and intimidating. I learned to expect very little from my teachers because I realized that they too were prisoners of this system. Throughout all twelve mandatory years in school, I have aimed to please my teachers by getting good grades, behaving well in class and being supportive to my peers. Sometimes I even liked what we studied, the content was interesting, but the pressure to think quickly, shoot answers immediately and competing all the time simply turned me off. Regardless, I did my best and in most cases I even achieved good grades. But I was not happy in school. Six days a week, eight hours each day I was hoping that the school day would end so that I could move on to my other interests.

It was many years later, during my masters and later doctorate work at American University (Washington DC), that I was given the opportunity to find new ways for teaching that are stimulating for children. It was then, that I learned of Howard Gardner’s theory of Multiple Intelligences. Dr. Gardner’s understanding of the human minds’ capabilities has given me hope, that life and learning can be stimulating, it is a matter of how one goes about teaching and learning. I was inspired by Dr. Gardner’s

work which make the claim that intelligence should be measured according to the variety of intelligences a person could potentially have. This has led him and others to discuss ways for stimulating the different intelligences as ways for enabling learners to arrive at higher academic achievement.

Dance was the key to door I was looking to open. I am a trained classical and modern dancer who have performed extensively in the U.S. and in Israel for many years. If I know something about myself, it was that movement, dance and dancing made me happy. I was able to remember dance sequences incredibly quickly and I found myself energized by dancing in space. I was able to think clearly during and after I danced. I was curious to find out if there was a way to connect moving in space with enhancing particular cognitive skills involving visual memory or concentration for example. I was also interested to know if moving in space can help children learn curriculum such as mathematics, reading, or enhance skills such as writing, spelling and grammar.

The answers I have found made me feel liberated and are presented here in the form of a theory of teaching and learning titled: The Kinematics Teaching Methodology (KTM). I applied the principles of KTM first on myself, and later with hundreds of children throughout this country through a large scale study that took place throughout 1999 and 2002. The findings of this study and others have concluded that using movement and dance helps not only improve one's visual memory, but also understanding mathematics curriculum, improving spelling and reading skills as well as overcome barriers posed by neurological deficits such as Dyslexia and Attention Deficit Hyper Activity Disorder (ADHD).

For me, the greatest source of joy and fulfillment comes from working with children who want to do well in school, but continually struggle. KTM has brought true enjoyment of learning for both me and my students. Students who continually failed before working with me were later able to show off their earned A's and B's. Furthermore, they were able to follow the teacher and participate in an effective manner in class. The revolution in these children's academic ability has led to an increase in their self esteem, happiness, positive attitude towards learning and desire to do better than before. Bitterness that has accumulated previously was replaced with positive energy towards learning, loving of teachers, loving of the exploration process and wanting to help others. These children are now on the way for success. This book is dedicated to them, the teachers and parents nation-wide with whom I have worked. And to all others who are looking for alternative ways for making the most of learning.

Introduction

This book presents a new way of looking at children's learning ability and offers an alternative instructional strategy that can be used by teachers and parents to maximize children's learning. The instructional strategy is titled: The kinematics Teaching Methodology (KTM), and is structured around stimulating the kinesthetic intelligence as means for stimulating other more traditional ways of learning, i.e., auditory and visual.

This book presents the application of KTM in the teaching of mathematics, reading, writing, spelling, anger management and body control. It is written for teachers (in training as well as those who already teach in schools) and parents. The book offers an explanation of what is kinesthetic learning, what is the application structure of KTM, activities that should be implemented in each curricular area and, and simple ways of providing diagnosis of children. All of the activities and diagnosis suggestions are easy to implement in either classroom or home settings.

Reading this book does not have to be done in sequence, as chapters are written independently. It is the author's hope that this book becomes a useful resource for teachers and parents as the information presented can liberate children from feelings of estrangement towards learning.

Chapter I: What is Kinesthetic Learning?

Definition

Kinesthetic learning is a cognitive ability that allows a person to learn and gain knowledge through moving in space while building upon one's thoughts, ideas, emotions, imagination and energies.

Learning and gaining knowledge refers to expanding one's active vocabulary, critical thinking, analysis and problem-solving in specific areas such as mathematics. The expression of such knowledge is expected to be demonstrated both orally as well as in writing.

Background

Until not long ago, psychologists and educators have referred interchangeably to kinesthetic and tactile learning when describing similar behavioral and learning characteristics. Namely, learning that is facilitated by moving objects in space, through real life experiences, by doing and through activities such as knitting, game boards and field trips. Several researchers have recognized kinesthetic and tactile learning as modes through which some children learn, but until now, there was no evidence that such learning modes help students improve their academic performance.

The lack of research until year 2000 that could support the development of instructional strategies that are kinesthetically based, has prevented many students from being able to make the most of their mandatory schooling years. All that has changed with several recent reports that

- a) defined what is kinesthetic learning;
- b) presented an instructional approach known as the Kinematics Teaching Methodology which is kinesthetic based; and
- c) demonstrated through quasi experimental studies the validity of KTM as an instructional strategy successful for teaching of mathematics and spelling of elementary grade students.

Between kinesthetic stimuli and dance

Kinesthetic learning requires the learner to connect with and build upon their thoughts, ideas, emotions and imaginations. These are expressed through the body's movement in space. The art of dance, in many ways, is based on the same pillars. In dance, the dancers expresses their (or the choreographer's) emotions, thoughts and intent through moving in space.

Kinesthetic learning, is a mode of learning that allows expressing one's thoughts, ideas, emotions and imagination to be expressed through moving in space. The creation of the dance, its structure, the movements that are included all are decided by the learner and based on the particular curriculum (or concepts) that is explored (with the teacher). An integral part of effective kinesthetic learning is using the body's movements to acquire new vocabulary, learn new ways for expressing one's intentions and thoughts, developing critical thinking skills to be expressed both orally and in writing.

In other words, just dancing for fun without crossing the bridge that allows further learning is not kinesthetic learning, its just dance. Children dancing on their own, (especially at the early stages of attempting to implement the KTM) or in a regular dance class (one that emphasizes dance styles such as Ballet or Jazz) would not lead to an improvement of academic achievement nor would it help students learn particular academic curriculum. Thus, teachers and parents play a pivotal role in turning the pure dancing experience into an effective learning process, which can only be achieved by working with a pre-defined curriculum and clear goals.

That said, it should be clarified that taking dance classes (such as Ballet, Jazz or tap) would likely help a child learn that particular dance style, contribute to their emotional growth, artistic expression, physical condition and sense of aesthetics. All of which are wonderful qualities and skills to have, but are non-related to using the body's movement to learn particular curriculum or develop desired cognitive skills.

Finally, moving in space as facilitated by KTM can be mistakenly identifies with the type of moving in space as facilitated in physical education classes. Physical education classes emphasize physical skills such as running, jumping, hopping, the rolling of a ball or throwing the to basketball into the basket. A focal point of all these activities is their competitive nature. Additionally, goals are for students to master particular motoric skills such as running or throwing.

KTM's emphasis is on self expression. The physical representations in space (or the moving in space) done by the learners are created by them, not the teacher. Finally, a successful implementation of KTM stresses the need for the learner to use words to describe the meaning of their movements and intent.

Chapter II: Who are Kinesthetic Learners?

Kinesthetic learners are those students who need to move in order to process information, remember it and use it later. Movement is defined by translating thoughts, ideas, imagination and energies into movement in space. About seventy percent of all children are kinesthetic learners, which means that their most effective way of learning requires movement. This does not mean that they can not learn in other ways, rather that movement helps all other ways of learning be effective. It is interesting, however, that most teachers implement instructional characteristics that require complete stillness which was found to shut down brain processes.

Introduction

Currently, the education system categorizes children according to their social and economic background as well as according to their academic achievement as measured by standardized tests. Standardized tests are the only acceptable and common method for evaluating what children know relative to their peers.

The results of these tests (which were recorded by the U.S. Department of Education) for the last twenty years have led to creating categories that indicate students' cognitive abilities such as Learning Disabled, Remedial Programs and Gifted.

The diagnosis of students abilities is done mainly based on written tests (standardized which are nationally administered) as well as informal (those created by teachers for their own evaluation of students' progress.) At times, students are referred to outside sources (i.e., psychologists who might administer a test or a battery of tests in order to clarify the exact area of a potential problem.)

Students who are sent for diagnosis are those, whose parents push for their evaluation. Others, (those who's parents can not afford the expensive evaluation), would await a diagnosis which will often be compromised by county budgetary needs.

The conventional and widely accepted academic performance range, indicates that (Popham, 1990):

2.27%	of the student population would perform three points above the national average of the academic range;
13.59%	would perform two points above the national average of the academic range;
34.13%	would perform one point above the average of the academic range;
34.13%	would perform one point below the average of the academic range;
13.59%	would perform two points below the national average of the academic range; and
2.27%	of the student population would perform three points below the national average of the academic range;

A second look at these numbers raises several interesting questions. First, could it be that roughly half of the student population is not able to do well on written tests? Second, does the poor academic performance on written tests is a measure of what students really know and are able to do? Are written tests a fair and accurate tool for measuring students ability to learn and teachers ability to teach?

Understanding the intricate components of students' learning and the cultural aspects that affect students' performance on written tests, has led some educators to re-evaluate the objectivity and therefore constitutionality of written and standardized tests. Here are the supporting arguments for this position:

First, written tests are biased because they are constructed in a way that require students to have skills, which are different than those required to demonstrate knowledge and understanding. Specifically, written tests require advanced reading and writing skills, without which thinking, comprehension, and analysis can not be demonstrated. Reading and writing skills are not correlated in any way to the second group of skills, thus the bias of written tests.

Second, with the growing non-English speaking population in the nation, standardized tests are constructed for students' who's English is their first language. This causes an unfair bias for about 35% of the student population whose English is not their native tongue.

Third, written tests are constructed for those who have strong visual skills, that is, those who are able to read information quickly. Most of the students, it turns out, are not visual learners, which most likely explains why such high percentage of students are not doing well academically.

Diagnosis of kinesthetic learners

Kinesthetic learners can be diagnosed by taking the Learning Style Inventory diagnostic test.¹ This tool of assessment helps teachers and parents understand better a child's learning style composition, that is, the degree to which each of the

While this is the most accurate tool for obtaining a person's learning style dominance, there are obvious behavioral manifestations that are characteristics for kinesthetic learners. Understanding these behavioral manifestations could help teachers and parents develop a preliminary understanding of a child's preferable learning modes and allow for the beginning of alternative instructional strategies even prior to going through the diagnosis process.

Kinesthetic learners behavioral characteristics

Kinesthetic learners share the same behavioral manifestations, which are intuitive in nature, which means that these behaviors are spontaneous response rather than intentional ones. These behaviors are divided to two groups, the first group of behaviors is considered to be positively affecting learning in the traditional classroom environment. The second group of behaviors is considered to be negatively affecting learning in the traditional classroom environment. Each of these behaviors has particular characteristics and is expressed in different ways. Below is a discussion of the characteristics of each behavior and ways in which it might be manifested.

Behaviors that positively affect learning

Common to all these behaviours is that they express children's strengths that can be used for helping them engage in constructive and meaningful learning. Five sub categories are found in this group of behaviours, which include a) free shaking; b) creativity; c) constant movements; d) voluntary movements; and e) confidence moving extensively in space.

Free shaking. Free shaking refers to the children pulling themselves out of the space where the instructional activity takes place and wildly and very rapidly shaking their limbs. It was observed that, when children are prevented from conducting their free shakes, they loose concentration, but when allowed to initiate the free shaking, they can demonstrate extraordinary focus and concentration levels.

One example is a child who used to pull out of the group to conduct his free shakes while I was asking the students a question. Upon coming back to the group, I asked the child to provide the answer to the problem presented while he was away. He not only knew the correct answer, but also reasoned and shared his thought process with the group. This type of behavior is very common for kinesthetic learners and especially boys. The accurate answers children give after free shaking and the high concentration level

¹ Available at Price Systems, Inc. Box 1818 Lawrence, KS 66044.

they demonstrate leads to the conclusion that teachers should allow children to conduct their free shakes as long as it is at the back of the class (in a place where it is not disruptive to everyone else in the room).

Creativity. Creativity refers to children's movements in space that are surprising in light of the fact that they might not have any background in dance or dance training. For example, a child might initiate extensive rolling on the floor, or elaborate hand movements which would be considered creative if the child has no experience in dance, dance training, and is not known in school for ever moving confidently and expressively through space.²

Constant movement. Constant movement refers to participants' kinesthetic and verbal manifestation demonstrating that they need to continuously move in space. Examples for verbal indications might include: "can we please have free dance?," "can we dance now?," or "when can we dance again?." Examples for kinesthetic manifestations demonstrating this might include students initiating dancing like or movements in space which are bigger and more energetic than the movements normally acceptable in sitting next to a desk.

Constant movement might be evident when students initiated kinesthetic expressions as they talk or explain something verbally. For example, in one class, a student was asked to analyze the position in space of a body shape. As he was explaining the position of the shape, he began making the shape himself and announced "look here, my arm is horizontal and my leg is vertical."

Finally, constant movement might be evident in students not being able to stand or sit still while the teacher explains or presents information or a problem.

Voluntary movement. Voluntary movement refers to kinesthetic responses that children initiate without the teacher specifically indicating that this is the mode through which an exploration or an answer is to be presented.

Confidence in moving extensively in space. Confidence in moving extensively in space refers to kinesthetic manifestations that indicated that children do not hesitate to move their bodies in space—they do not hold back when moving, instead are able to use their body as a tool for exploring dance moves in new heights and transitions in space.

Behaviours that negatively affect learning

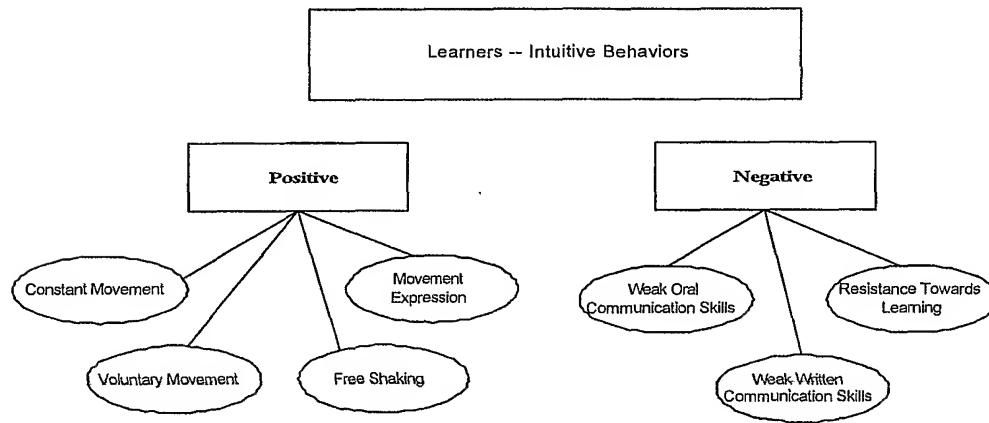
Common to all the behaviours that negatively affect learning in the traditional classroom is that they express children's difficulty to process auditory and written information. Three categories are found in this group of behaviours: a) lack of focus; b) inability to listen/read directions; and c) dislike/resistance towards reading and writing.

The lack of focus. The lack of focus refers to behaviors characterized by children "spacing out," looking away from where the instruction takes place. They might find books or other things to be busy with, and when called on to provide a response to what is discussed they might respond: "hhhaaa?"

The inability to listen/read directions. The inability to listen/read directions refers to behaviors characterized by children not being able to respond to the discussion or the problem presented orally or in writing. Children might stand silently, motionless with fear in their eyes, or a blank expression or pull themselves out of the group immediately when it is their turn to answer.

² Based on teachers experience and interaction with their students, they are able to identify those students who are able to move well in space (examples might include participation in sports or dance activities, or even observing a child dancing in the hallways), and those who are not inclined to move well in space.

The dislike / resistance towards reading and writing. The dislike/resistance towards reading and writing refers to behaviors characterized by children agonizing and complaining every time they are asked to complete a task involving writing or reading. They might also move their bodies in ways that indicated that they are not comfortable with activities that required writing and reading. For example, they might pull away from the paper where the activity is written, or loose the paper on which they are asked to write the answer to a question. They might also move back and forth to and from the paper, which would make it even more difficult for them to keep their eyes on the text or question.



Chapter III. The Essence of KTM

Common Misconceptions

Kinesthetic and tactile stimulus have been regarded as one for many years, thus, the misconception about the differences between the two stimuli. Tactile stimulus is evoked through the use of objects that are manipulated in space. Anything that can be touched and is external to the human body and can be manipulated by the learner is tactile. Examples of tactile stimulus include building blocks, beads, plastic articles, sheets of fabric and the like.

Kinesthetic stimulus is evoked through the use of one's body in order to create a statement that reflects upon, describes or communicate about something or someone. Essential for an effective kinesthetic experience is the thorough use of spoken language to direct and focus the use of the body as a medium for developing a greater understanding of the concept explored.

Implementing KTM

Correct implementation of KTM requires a ten-step process. Skipping each step would deter a child from achieving its highest possible academic achievement. The ten-step process is as follows:

Step #1:

All instruction should begin with a verbal explanation of what is about to be done. The use of the blackboard or printed material is recommended but should not be emphasized because most of the learning is done once students begin to dance.

Step #2:

Help students begin to develop a "shape bank" and "transition bank". A shape bank is formed by students creating with their bodies shapes in space that they like. Those can be large, small, high tall, wide, on one foot, while sitting, etc. These shapes should be written on paper by the learners, so that there is a record of the shapes for later use.

The documentation of the shapes on paper is crucial for helping students develop a visual memory of three-dimensional shapes on a two dimensional mode (paper). In addition, this method helps instill confidence in students' own writing abilities and skills.

Step #3:

The "transition bank" is formed by students creating ways to connect one shape to another. Transitions can be distinguished by their pace such fast or slow, or by their path in space such as a curved or shortest path. The transitions should be documented on paper by the learners, so that there is a record of the transition for later use. Each transition should have its own sign and students should be able to recognize those signs and explain the connection between the visual shape of the sign and what it symbolizes. This is necessary so that, students begin to develop a relationship between how shapes look and what they mean. An example for the sign representing a sharp transition is: **(fill in the sign)**. The sign resembles a sharp transition in that its own writing requires a sharp action on the paper. An example for a curved transition is: **(fill in the sign)**. The sign resembles a curved transition in that its own writing requires the creation of an arch on the paper.

Step #4:

The teacher presents the information or problem and frames a question to be explored both kinesthetically (by students putting together a dance phrase) and by writing information on paper.

Step #5:

Teacher assigns students to work either alone, in groups of two, three or four. It should be emphasized that all KTM work requires both kinesthetic movements as well as written documentation on paper and verbal explanation of one's work.

Step #6:

Teacher allocates time for students to work during which time he or she rotates between the groups and makes him or herself available to answer questions or provide clarification.

Step #7:

Teacher calls for everyone's attention and asks every group to summarize its work process, new information they arrived at, conclusions, or what they might have learned from each other.

Step #8:

Teacher gives groups another five minutes to prepare their group demonstration to be presented both kinesthetically as well as in writing.

Step #9:

Each group demonstrates their work (kinesthetic, written and oral explanation) to the entire class. At the end of each demonstration the group will verbally explain their process and a discussion will be facilitated between the presenting group and the "audience" with the purpose of clarifying and answering questions the "audience" might have.

Step #10:

Teacher concludes the session by explaining the homework and providing an example of how KTM can be used at home to further the learning.

How to implement KTM successfully

A successful implementation of KTM requires not only understanding the process of implementing KTM but also understanding the subject matter taught. This means familiarizing one self with the goals and objectives of the subject taught as defined by your State Department of Education.

Implementing KTM requires understanding that the process that takes time and that it has a particular structure that should be followed carefully, namely:

- 1) Verbal explanation of the activity and what should be done verbally.
- 2) Providing a demonstration of the kinesthetic *principles* students should use in their work.
- 3) Allowing students enough time to read the activity and design a solution process.
- 4) Reminding students that documenting on paper their kinesthetic process is essential for their success.
- 5) Encouraging students to build on their thoughts, ideas, imagination and experiences when developing the "shape and transition bank".
- 6) Telling students that meaningful learning requires continual repetition of kinesthetic phrases.
- 7) Explaining to students that they should be able to **visualize** their own bodies moving in space before they are able to perform their kinesthetic presentations.
- 8) Requiring students to demonstrate their work as it is presented kinesthetically by performing it to the entire group as well as providing verbal explanation of the work the movements represent.
- 9) Explaining to students that looking at their peer's work will enhance their own.
- 10) Encouraging students to work together when appropriate in order to arrive at better solutions (both kinesthetic and written).
- 11) Insisting that students' work should also be done in writing that it, the kinesthetic process should lead to a coherent understanding of the problem and its solution and should be written down.

Implementation Taboos

Whether you are a teacher or a parent who would like to incorporate kinesthetic activities in your daily teaching, make sure that you do not make the following mistakes that could lead to a counter productive result. Following are some pedagogical taboos that should be kept in mind:

1. Never force all students to find one common movement to represent a letter.

For example, if you are teaching the alphabet letter O should not be executed by all students raising both their hands over their heads, creating a round ball shape. Just as a written repetition of an arbitrary letter shape does not help LD students remember the shape of that letter, an arbitrary and dictated choice of movements to represent a letter will be similarly useless. In order for the choreographic process to be effective, each child needs to be given the freedom to decide what movements and body parts represent each letter, and to find a meaningful explanation or description to what that body part represents.

The teacher makes sure that the choices students make are meaningful to them by asking them to share the reasoning for their choices. If the emotional aspect attached to each word or letter is weak, often the learner may not be able to regenerate the letter shapes or sequence. If, after dancing the letter or the sequence of letters in a word several times, a student is not able to recall the shapes of letters and their sequence in a word, the teacher should assume that meaningful connections were not used. The learner is then asked to draw upon other experiences that are powerful and repeat the process with new dance moves.

2. Do not allow a student to use different representations for the same alphabet letter.

The goal in using kinesthetic memory is to have the brain associate one kinesthetic shape with one letter; having two or more body moves for one letter could lead to confusion and frustration.

3. Do not assume responsibility for remembering each student's word associations, or signs for numbers, transitions or kinesthetic phrases.

At the beginning of the process, it should be made clear that the learners must find ways to remember their own work. The teacher reminds students that they can be more successful in this process if they record their kinesthetic movements on paper, drawing body shapes or sketching arrows to indicate direction and/or elevation of movements.

Frequently Asked Questions

How does movement assist in the learning process?

The creation of movement can only take place based on an exploration of one's emotions, thoughts, ideas, memories, imaginations and energies. The emotional experience that accompanies motion in space generates strong sensations. These sensations register in the brain and the body and become concrete knowledge. Instruction that builds on these sensations creates a foundation on which specific knowledge such as of mathematics, reading, writing, spelling, and behavioral issues can be established.

What is the significance of visualizing ("seeing") one's body moving without the space?

This type of "seeing" requires a developed sense for recollecting and visualizing letter- shapes and letter-sequence which is essential for learning to spell, read and write. LD students who lack the neurological paths that could facilitate such recollection from listening or seeing (which are the basis for common instructional strategies that emphasize auditory and visual stimuli) have no other known alternative methods for acquiring spelling, reading or writing skills. KTM as it is presented here allows for a) the development of strong spelling, reading and writing skills by building on existing neurological paths; and b) the building of new neurological paths that allow for an improved ability to process information from written text and heard explanations.

Are kinesthetic learners doomed to use the kinesthetic process?

In most cases, kinesthetic learners will have to apply KTM on their own for a while before they are able to not use the body's movement as a tool for remembering information. However, once integration of information obtained through KTM is used regularly the need for KTM implementation can be reduced entirely.

Are kinesthetic learners doomed to move in space in order to evoke memory of concrete information?

No. If meaningful connections were created in KTM's stages 4 & 5 and the learners successfully achieved stages 6, 7, & 8, they would have created a unique neurological connection for each word. The mere imagining of the body's movement in space would trigger the recall of the desired information without actually moving in space.

How often should the Kinematics Teaching Methodology be facilitated?

The KTM should be facilitated daily in each session and in each curriculum area, not instead of, but rather as a fertilizer of regular instruction. If KTM were applied thoroughly, all other instruction would also be successful. Implementation of KTM with children as young as three years old, would yield much higher academic achievement than children who are taught regularly.

In cases where KTM begins to be incorporated with upper grades of elementary and middle school, a daily implementation should be initiated until a) curriculum goals are achieved; and b) the foundation created is wide enough that less movement and more audio and visual modeling can be implemented; and c) students develop a strong comfort level using KTM as needed.

Could KTM be facilitated in regular classrooms?

Any space that is quiet and designated to learning could be used for implementing KTM. This would include a regular classroom, a dance studio, a section of the cafeteria, out on the lawn or even an abandoned hallway.

What grade levels would benefit the most from KTM?

Best academic results would be achieved if KTM were to be implemented with children as young as three year of age. KTM can be used to enhance literacy skills, auditory and visual processing, enhanced fine and large motor skills as well as analysis skills.

Are there any differences in the responses for KTM between male and female students?

Female students seem to be able to respond more quickly to KTM than males because the process involves connecting to feelings and emotions. However, a teacher can choose to place greater emphasis on associations, which would encourage males to express their high energies with highly energized movements. This would result in a greater participation and a greater level of interest from males. It is interesting to observe that males tend to choose energetic and more forceful movements while females tend to choose softer movements. Both type of movements should be encouraged with the exception of excluding movements are might harm self or others.

What type of homework can be given when implementing KTM?

Homework using KTM should include repeating the process of applying KTM at home as was done in class, on the same curriculum and on the same information taught. In addition, KTM should be used to work on new information and as a method for enhancing written homework. Specific exercises should also be given to strengthen particular motor or cognitive skills.

What kind of tests can be given to kinesthetic learners that would measure their spelling ability?

Three types of tests can be administered when implementing KTM. The types of tests are: written, auditory and kinesthetic. Written tests, typed in letter size 14 or 16, might include for example misspelled words which students need to identify and correct. Other written tests might require the teacher to say aloud information or a question and for students to write the answer on the test sheet.

Auditory tests might require the teacher to say aloud information or a question and the learners to respond aloud. Kinesthetic tests might require the teacher to ask a question or give information aloud in writing and the learners present the answer both kinesthetically and by explaining the answer aloud. Emphasis should be placed on learners supplementing their kinesthetic presentations with an explanation of what each movement represents.

The auditory and kinesthetic tests could be administered to large groups of children as well as individually and to small groups pending class size, time allocated and academic goals.

When would it be best to administer these tests?

Written tests are best for evaluating students' knowledge level prior to starting a new instructional strategy, during the implementation for such a strategy and for measuring whether an instructional strategy was effective. Currently all education systems consider written tests as the only valid vehicle for tracking academic achievement. Thus, such tests should not be abolished.

In the same time, it should be remembered that written tests have severe negative effects on students' motivation to learn, self-confidence, concentration level and anxiety level, all of which cause low academic achievement. Auditory and kinesthetic tests, on the other hand, allow students to demonstrate their true understanding bypassing the obstacles put by written tests. Thus, the last two tests are crucial in helping students regain self-confidence, motivation, and self-esteem as related to schoolwork. For these reasons alone, an abundance of auditory and kinesthetic tests should be administered with a clear emphasis that knowledge gained while using KTM should be eventually translated into written tests.

Do kinesthetic tests require the teacher to understand movement?

No. It is not the teacher's responsibility to interpret the meaning of each student's kinesthetic representation. This responsibility lies with students and it should be made clear that students should find words to describe what their dance means. However, a teacher who can offer students feedback in areas such as energy level, dynamics or accuracy of execution, will be able to enhance students' kinesthetic and emotional experience.

Should a teacher help children find words to describe what their kinesthetic representation means?

Absolutely. Helping children find words to describe what they mean should be the goal of teaching at any stage at any time. This can be done by presenting students with a world or words, explaining them, giving an example and requiring students to use them for purpose of internalizing them.

Chapter IV. Kinesthetic Instruction in the Mathematics Classroom

Introduction

Traditional teaching of mathematics consists of presenting information through lectures, writing demonstrations on the blackboard and giving students exercises to solve from a book. Students are expected to think on their own and raise their hands in order to say the final answer. In this approach for teaching students' understanding is measured by how well they do on written tests.

This traditional approach for teaching and assessing what students know requires students to be able to a) think in the abstract, b) process information presented visually and through lectures; c) sit still for long periods of time; and d) quickly express in a mathematical form the answers to written mathematics questions.

This traditional approach for teaching was found to help less and less children understand mathematics. This is because we have many more children today who do not possess the cognitive, social, emotional or cultural background that can support effective learning in this environment.

Effective Ways for Teaching Mathematics

The Kinematics Teaching Methodology defines a variety of components that mathematics instruction must consist of, in order for instruction to help students understand mathematics. In general, a teacher would explain the information and problem to be worked on in a concise manner and provide a kinesthetic

example that is analyzed for students as an example. Students would then be asked to begin using the kinesthetic process as a method for devising a solution process as well as arrive at the end result. The teacher would let students work for a while, before beginning to visit with groups or individuals. The teacher would only intervene student(s)' work if it was obvious that they needed help or if they were to ask for help. The teacher's approach for helping should be structured around asking students to explain what they understand and what help they need.

A successful learning process on the part of students must allow them enough time to conduct all of the following steps:

- 1) Thinking of processes and procedures alone as well as in groups;
- 2) Exploration of the meaning of concepts and operations kinesthetically, i.e., through space;
- 3) Clarifying and practicing of the presentation of processes and procedures as expressed kinesthetically;
- 4) Demonstrating the kinesthetic presentation to the entire class;
- 5) Explaining of how the kinesthetic presentation expresses the mathematical problem and its solution process;
- 6) Practicing the way in which the kinesthetic demonstration needs to be written mathematically.

In general, writing assignments should only be given after the kinesthetic process has taken place. Throughout the kinesthetic process, students should be offered to use paper and pencil, encouraged to listen to each other and find ways to document on paper the solution process they work on as well as the final answer.

A successful teaching that is based in the kinesthetic experience will allow students to fully complete the kinesthetic process before application to paper and pencil is done. Implementing this approach helping students gain confidence in their own knowledge and encourages them to tackle areas that are weak such as reading and writing.

The goals of the Kinematics Teaching Methodology in the mathematics classroom

The goals of implementing the Kinematics Teaching Methodology in the mathematics classroom are to provide students with ample opportunities to:

- 1) Explore mathematics in a real-world environment;
- 2) Discover the connection between abstract mathematical representations (i.e., numbers, operations, patterns and formulas, etc.) and the way in which these exist in the body and in space;
- 3) Practice making the connection between dance and movement and their mathematical meaning as expressed in writing and verbal communication.
- 4) Exercise a variety of ways to problem-solve (i.e., find several ways for solving) the same mathematical problem;
- 5) Develop a mathematical language (vocabulary and processes) through the exploration of mathematics in space.

The objectives of the Kinematics Teaching Methodology in the mathematics classroom

The objectives of implementing the Kinematics Teaching Methodology in the mathematics classroom are for students to be able to perform all of the following:

- 1) Mathematics in a real-world environment;

- 2) Make the connection between abstract mathematical representations (i.e., numbers, operations, patterns and formulas, etc.) and the way in which these exist in the body and in space;
- 3) Explain the connection between dance and movement and their mathematical meaning as expressed in writing and verbal communication.
- 4) Practice a variety of ways to problem-solve (i.e., find several ways for solving) the same mathematical problem;
- 5) Acquire a mathematical language (vocabulary and processes) through the exploration of mathematics in space.

Kinesthetic Activities for teaching addition, subtraction and multiplication of whole numbers

The following section presents examples for a variety of kinesthetic activities for teaching addition, subtraction, multiplication and division of whole numbers. These activities presented are examples and are not meant to demonstrate a complete curriculum structured based on developmental or cognitive abilities.

Each example includes pedagogical remarks that are meant to help you better facilitate each activity. The goals of these remarks are to explain how each activity can be extended to deepen what is learned.

Examples for Kinesthetic Activities -- Addition of Whole Numbers

The following examples demonstrate the teaching of addition of whole numbers.

Example #1:

Activities in this example are designed to practice students' skills adding single-digit numbers up to the number nine.

Goal: students will understand that addition of single-digit numbers can lead to a sum no greater than the number nine.

Objective: students will be able to add up single-digit numbers up to the number nine.

Motivation: for each of the problems in this example,³ instruct students to use "*poses*" from their "pose bank" to create a dance.

Present⁴ one math problem and demonstrate one alternative for solving it kinesthetically. Finally, ask students to be ready to explain to the whole class the Sum of each math problem.

Below is an example for one acceptable kinesthetic/mathematics based answer to such problems:

$$1 + 1 =$$

A student will demonstrate one shape and then repeat it a second time. The learner will then explain that the first number is represented by one shape plus the same shape performed again, and the total number of shapes danced equals two.

Extension of this activity is the emphasis on Additive Identity which is one of the properties of addition. Present to students the option of adding zero to any of those sums and reflect that kinesthetically. Students would need to recognize that the number zero means no movement, stillness, which in effect does not change the sum.

³ See appendix number 1 for the list of math problems.

⁴ The presentation can be on the black board, overhead projector or through handouts or other printed material that is individually distributed to students.

Another extension is to work on the Commutative Property, another addition property. To do that present students with the following example: $4 + 2 = 2 + 4$. Ask students to translate this math sentence to a kinesthetic phrase. Students would have to reverse the order of their presentation whether they used poses or counts as the main subject of their presentation.

Example #2:

Activities in this example are designed to practice students' skills adding double-digit numbers up to the number twenty.

Goal: students will understand that addition of single and double-digit numbers can lead to a sum no greater than the number 20.

Objective: students will be able to add up single and double digit numbers up to the number twenty.

Motivation: for each of the problems in this example,⁵ instruct students to use *poses and shapes* from their "pose and shape bank" to create a dance.

Present one math problem and demonstrate one alternative for solving it kinesthetically. Remind students that each problem in this set lacks a number that needs to be discovered. Finally, ask students to be ready to explain to the whole class the sum of each math problem.

Below is an example for one acceptable kinesthetic/mathematic based answer to such problems:

$$2 + 10 + \underline{\quad} = 20$$

A student will dance the first shape twice, and then choose a transition that repeats ten times. They will count out loud the number of shapes and transitions they perform. Finally, they will explain that in order to arrive at the number 20, they need additional 8 movements. They will then perform the remaining one last transition that is repeated eight times.

Students can choose a different combinations of shapes and transitions, but what is important is that each number is represented by either a shape or a transition, and those are counted.

An extension would be to work on the Associative Property, a third addition property. Present students with a math problem such as the one demonstrated below and ask them to create a kinesthetic phrase that expressed that problem.

$$(5 + 3) + 4 = 5 + (3 + 4)$$

Students' demonstrations should feature a change in the order of either movements or counts they perform on either side of the equation.

Example #3:

Goals: students will understand that addition of double-digit numbers can lead to a sum no greater than the number 99.

Objective: students will be able to add up double-digit numbers up to the number 99.

Motivation: for each of the problems in this example,⁶ Instruct students to use *counts* to create a dance.

⁵ See appendix number 2 for the list of math problems.

Present one math problem and demonstrate one alternative for solving it kinesthetically. Finally, ask students to be read to explain to the whole class the Sum of each math problem.

Below is an example for one acceptable kinesthetic/mathematics based answer to such problems:

$$15 + 1 + \underline{\quad} = 20$$

A student is counting aloud his or her own meter.⁷ The learner performs one movement that lasts fifteen counts. He then performs the same movement again, but this time the movement lasts one count. The learner continues to count until the number twenty and explains that another movement needs to be performed and should last four counts. The learner then performs the chosen movement again and makes sure that it lasts four counts in space.

The teacher can further the learning by asking whether there is another, shorter way, to count until the number fifteen? Students should arrive at the conclusion that it is possible to count three units of five counts each in order to arrive at the number fifteen. This would be written mathematically as follows
 $(1 + 1 + 1 + 1 + 1) + (1 + 1 + 1 + 1 + 1) + (1 + 1 + 1 + 1 + 1) = 15$
 or
 $(5) + (5) + (5) = 15$

Examples for Kinesthetic Activities -- Teaching of Subtraction of Whole Numbers

When using the kinesthetic mode to teach subtraction is it important to understand the limitation of this medium. Movements can only be done, therefore they exist. It is not possible to subtract a movement from another because the essence of executing movements means adding them to what was seen which is an addition operation. To overcome this limitation, a child would need to reverse the subtraction operation into an addition problem, in order to demonstrate the "taking away" of movements or counts.

Example #4: subtracting single-digit numbers up to the number one.

Goal: students will understand that subtraction of single-digit numbers can lead to a difference no lesser than the number one.

Objective: students will be able to subtract single-digit numbers that lead to a difference no lesser than the number one.

Motivation: for each of the problems in this example,⁸ instruct students to use "*poses*" from their "pose bank to create a dance.

Present one math problem and demonstrate one alternative for solving it kinesthetically. Finally, ask students to be ready to explain to the whole class the difference of each math problem. It is important to help students arrive at the understanding that the action of subtraction requires the second number to be reduced from the first. In other words the minuend is the original number, the subtrahend is the number taken way and the difference which is the result.

Below is an example for one acceptable kinesthetic/mathematics based answer to such problems:

Here is the math problem a student is presenting kinesthetically, it features the Take-Away or Park-Whole subtraction model

⁶ See appendix number 3 for the list of math problems.

⁷ See dictionary of terms for definition.

⁸ See appendix number 4 for the list of math problems.

$$8 - 2 =$$

The learner demonstrates four poses that he repeats twice and explains that this will be written mathematically as follows: $4 \times 2 = 8$

The learner rests for a second and then performs the last two poses from the original sequence. The learner explains that these two poses represent the number two that need to be taken away from the total number of movement. Finally, the learner performs the original sequence omitting the last two poses. The learner explains that the difference is six, or six poses.

This type of action or presentation follows the principle of Take-Away or Part-Whole subtraction. It features the whole, the number being taken away and counting the remaining.

Students should be asked to reverse the process to practice that subtrahend and the difference make the minuend. In this case, reversing the subtraction would look as follows:

$$6 + 2 = 8$$

Another way of practicing subtraction is performing the Comparative Subtraction Model. This method emphasizes the missing number that leads to the minuend. Here is an example for a kinesthetic demonstration of this model:

Two students are standing side by side. Both have learned the 8 poses dance. They simultaneously will begin to dance that pose phrase. The learner standing on the right will dance the phrase in its entirety and the learner on the left will stop after the second pose. This will visually accentuate that the missing number of poses is six, which will be danced by the learner on the right.

A third way of practicing subtraction is performing the Missing –Addend Subtraction Model. This method emphasizes the continual counting of the missing number until arrival at the minuend. Here is an example for a kinesthetic demonstration of this model:

The learner will begin dancing two poses and count simultaneously the numbers one and two. The learner will then continue to count the remaining poses while counting out loud the numbers, three, four, five, six, seven and eight. The learner will explain that six more poses were danced after the first two to arrive at the number eight.

Example #5: subtracting double-digit numbers with a difference of no lesser than the number one

Goal: students will understand that subtraction of double-digit numbers can lead to a difference no lesser than the number one

Objective: students will be able to subtract double-digit numbers with a difference of no lesser than the number one.

Motivation: for each of the problems in this example,⁹ instruct students to use counts (represented by as many poses and transitions) to create a dance.

Remind students that the counts should represent the minuend, the subtrahend and the difference.

Present one math problem and demonstrate one alternative for solving it kinesthetically. Finally, ask students to be ready to explain to the whole class the difference of each math problem.

Below is an example for one acceptable kinesthetic/mathematics based answer to such problems:

$$99 - 43 =$$

⁹ See appendix number 5 for the list of math problems.

The following example demonstrates that in double-digit subtraction, the action is made on lessening the counts of one transition rather than finding one pose for each number in the problem.

A student has decided that it would be easier to deduct 40 from 90 and 3 from 9. The learner chose two demonstrate the number 90 by performing one transition that lasts one set of 10 counts and repeating it nine times. Mathematically it is written as follows: $9 \times 10 = 90$

The learner then deducted 4 sets of ten counts from the first transition.

$90 - (4 \times 10) =$

The learner then performs the ten count transition 4 times, and continues to count out loud in tens until the number ninety. The learner explains that fifty count or five x ten count sets need to be taken away from the original 90 phrase. The learner explain that the number 50 needs to be added 9, which makes 59 and deducted 3 which makes 56. Each of the single-digit numbers is represented by a pose. The learner explains that the difference 56 will be represented by one ten-count transition that is repeated 5 times plus six poses in place.

Examples for Kinesthetic Activities -- Teaching of Multiplication of Whole Numbers

Teaching of multiplication of whole numbers should only be done after a solid foundation of addition and subtraction is formed. Students should be familiar with basic facts and models of counting of addition and subtraction. Below is an example for a lesson plan that aims to focus on the teaching of the three table.

Example #6:

Goal: students will understand the essence of the number three multiplication table

Objective: students will be able to demonstrate knowledge of the number three multiplication table.

Motivation: for each of the problems in this example, instruct students to use shapes from their "shape bank" to create a dance.

Emphasized vocabulary: Factors,¹⁰ Product¹¹

Activity #1: Choose three shapes, write them as stick figures and learn to perform them as a sequence.

Part I: Repeat the sequence once to music and write this mathematically using an addition operation.

Part II: Repeat the sequence a second time to music. Ask students to write this mathematically using a multiplication operation.

Ask students to continue repeating this activity 10 times, writing at the end of each repetition the product of how many dance moves all together they have performed. At the end, ask students what 3×0 equals.

Activity #2: Create a table that demonstrates the relationship between the sequence and the number of times it is repeated. Such as:

¹⁰ A factor is a number that is involved in a multiplication operation.

¹¹ Product is the result of multiplying two numbers.

$$\begin{array}{l} 3 \times 1 = \\ 3 \times 2 = \\ 3 \times 3 = \end{array}$$

Activity #3: Ask students to demonstrate this table as a group dance. 10 students should stand in row and each should receive a number corresponding to their location in that row. Assign a 3 count dance sequence that all students can perform. Each student should repeat the dance the same number of times that corresponds to their location in the row. For example, the learner standing fifth in the row would repeat the dance sequence five times and dance a total of 15 counts.

Student #/ # of times the jump was repeated	#1	#1	#2	#3	#4	#5	#6	#7	#8	#9	#10
	0	3	6	9	12	15	18	21	24	27	30

Example #7:

Goal: students will understand the essence of the Commutative property.

Objective: students will be able to apply the commutative property in mathematics problems.

Motivation: for each of the problems in this example, instruct students to use shapes and transitions from their "shape bank" to create a dance. Instruct students to assign counts to their dance.¹²

Curriculum Focus: The Commutative Property, Product

The Commutative Property of Multiplication:
means that the order of two factors does not affect the product. For example: $a \times b = c$ and $b \times a = c$

Activity #4: Ask students to explain the following sentence: $4 \times 2 =$
Students should read the mathematical sentence out loud and explain what needs to be done to arrive to the correct product. The kinesthetic solution should demonstrate through the counts the product of the problem. Ask students to work alone towards solving the problems in this example both mathematically and kinesthetically, and then work in pairs on the same solution. Ask students whether there is another way to write this mathematical sentence. Ask them to demonstrate both in writing and kinesthetically all of the alternative ways for writing this mathematically.

Activity #5: Repeat the same activity with the following sentence: $5 \times 4 = ?$
Ask groups of four students to demonstrate this problem kinesthetically.

Activity #6: Repeat the same activity with the following sentence: $3 \times 5 \times 7 = ?$
Ask groups of three and five students to demonstrate this problem kinesthetically.

Activity #7: Present students with the following sentence: $12 \times 2 \times 5 = ?$
Ask students to read the mathematical sentence and explain what needs to be done to arrive to the correct product. Ask students to demonstrate the several alternative ways for solving this mathematical sentence in writing and kinesthetically.

Activity #8: Repeat the same activity with the following sentence: $25 \times 5 \times 7 = ?$
Ask groups of five and seven to demonstrate this problem kinesthetically.

¹² Students should be able to explain what is the count for each movement and transition in their dance.

Activity #9:

Repeat the same activity with the following sentence: $34 \times 16 \times 4 = ?$
Ask groups of four to demonstrate this problem kinesthetically.

Chapter V. Kinesthetic Instruction in the Teaching of Reading and Writing

Reading and writing fluency is conditioned upon the brain's ability to process visual information and the body to generate pre defined written information on paper. Some learner are able to master reading and writing quickly and without much difficulty while others need to invest many hours before they are able to read and write fluently. Some of the difficulty that faces the second group of learners could stems from neurological condition that prevent them from being able to process the information presented. Regardless of whether a learner is a fast learner or struggles grasping these two very important skills, the exercises that are presented in this section will enhance the learning and reinforce good reading and writing skills.

Mastering reading and writing requires the learner to establish strong skills in several sub areas including phonological awareness, sound-symbol correspondence, decoding (i.e., letter recognition), visual and verbal memory, pronunciation, and fine and large motor skills. This chapter opens by explaining each of the sub area skills necessary in order to master reading and writing. Next are presented a variety of kinesthetic exercises that are designed to enhance each sub-area. Please note that pedagogical remarks are included in order to enhance the understanding of the role teachers and parents play in helping children learn to read and write.

Reading and Writing—Sub Skills

A successful teaching of reading and writing should address all of the sub area that compose these abilities which are:

- 1) Phonological awareness;
- 2) Decoding;
- 3) Encoding
- 4) Visual and verbal memory;
- 5) Pronunciation;
- 6) Annunciation; and
- 7) Fine and large motor skills.

Phonological Awareness:

The ability to associate the sound of a letter or combination of letters.

Decoding:

The ability to recognize letter in situations involving common words as well as non-words.

Encoding:

The ability to remember each letter

Visual and Verbal Memory:

The ability to remember the shape of letters and how they sound when spoken out loud.

Pronunciation:

The ability to fully sound out written information.

Annunciation:

The ability to say out loud written information.

Fine motor skills:

The ability to use the fine muscles of the hand in order to write efficiently

Large motor skills:

The ability to use large muscles of the body and especially the arms to write effectively.

The following section presents a variety of kinesthetic exercises that are designed to strengthen each of the seven sub-areas of reading and writing.

Reading and Writing Exercises

Implementation of the exercises in this section should be done sequentially as they are presented according to difficulty order, simple exercise proceed complex ones. It is also recommended to demonstrate the letters for all the written exercises presented in this chapter on 18 X 23 inch paper, a large dry-erase board, a flip chart or a black board.

Phonological Awareness:

The ability to associate the sound of a letter or combination of letters. It is recommended that all the vowels (i.e., a, e, i, o, and u) are taught prior to the consonants (that is, b, c, d, f, g, s, k, j, l, m, n, p, q, r, s, t, v, w, x, y and z.).

Exercise #1:

Present a capital letter of one of the vowels in a written form. Demonstrate to the learner the way in which the letter is written and pronounced. Ask the learner to repeat out loud the way in which the letter is pronounced. Ask the student to think of an association to the sound the letter makes. Demonstrate again the way in which the letter is written and ask the learner to create a transition that progresses in space in the exact way the letter is written and that expresses the association of the letter. Ask the learner to repeat that transition several times.

Repeat this process with all vowels and emphasize that vowels that appear in the middle of a word will only be written in lower case.

Exercise #2:

Present a capital letter in a written form and demonstrate the way in which the letter is written. Emphasize the pronunciation of the letter and ask the learner to repeat after you the way in which the letter is said out loud. For example, the letter M is written from left to right, top-down-up and down twice. Ask the learner to think of a word that begins with the letter M, such as the word MOTHER. Ask the learner to perform a transition that represents the way in which M is written. Repeating the kinesthetic representation of the letter M should express the qualities of mother.

It is very important that the learner repeats the name of the letter as it is performed kinesthetically. The facilitator should emphasize a correct execution of the transition in space as well as correct pronunciation of the name of the letter.

Teaching the lower case "m" will follow the same guidelines. Finally the learner will be asked to perform both upper and lower case "m" while saying the word that begins with that letter. Students should be asked to repeat the transition for each letter at least three to five times. You would need about 10 to 20 minutes for each letter you teach.

Exercise #3:

Begin presenting combination of consonants and vowels in a written form. Repeat the following process:

- 1) say the name of the letter out loud;
- 2) ask the learner to repeat;
- 3) say the correct pronunciation of combinations of consonants and vowels;
- 4) ask the learner to repeat;

- 5) demonstrate the way in which the combination of letters is written;
- 6) ask the learner to create a transition that represents the written form of the letters;

There are many consonant-vowels combinations. A list of those that should be taught is presented below. It is important to begin according to difficulty level and continue to more complicated forms. AU; CK; EA, EAU, EE, EI, IE; GH; OA, OO, OU, OUGH, OUS; SION, SS; THER, TION.

Exercise #4:

Apply the form as presented in exercise #3 of this section to teach common words that involve the consonants and vowels combinations discussed earlier. A list of these words is included for your convenience:

Words involving the letter combination AU

Bauble	Caution	Launch
Baud	Daub	Launder
Caucasian	Daube	Mausoleum
Caudad	Daughter	Mauve
Caudate	Daut	Naught
Caught	Faucal	Paunch
Caul	Fauces	Pause
Caulk	Faucet	Sauce
Causal	Faugh	Saucy
Causation	Fault	Taught
Cause	Faun	Waul
Causey	Laugh	
Cautery	Laugher	

Words involving the letter combination **CK**

Flock	Kick	Lick
Haddock	Knock	Lock
Hammock	Knock	Luck
Hemlock	Kopeck (also Kopek)	Mock
Jack	Lack	Mockery
Jackass	Lackey	Muck
Jacket	Lameduck	

Words involving the letter combination **EA**

Flea	Heavy	Leader
Sea	Idea	Leopard
Tea	Ideal	Linear
Grease	Impeach	Meadow
Great	Instead	Meal
Freak	Jeans	Mean
Head	Jealous	Meant
Heart	Knead	Measure
Heaven	Lead	Meat

Words involving the letter combination **EAU**

Beauty	Beautiful
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Words involving the letter combination **EE**

Bee	Engineer	Feeling
Beech	Feed	Feet
Between	Fee	Freeze
Committee	Feeble	Fleet
Deep	Feedback	Free
Deer	Feel	Green

Greet	Guarantee	Keep
Guarantee	Heebie-jeebies	Keeper
Geezer	Jeer	Knee
Heebie-Jeebies	Jeez	Leech
Sweet	Jubilee	Manatee
Breech	Keel	Meet

Words involving the letter combination **EI**

Bignet	Freight	Heinous
Being	Feint	Meiosis
Fein	Geisha	
Foreign	Height	

Words involving the letter combination **IE**

Bield	Field	Grievance
Biennale	Frieze	Grieve
Biennial	Fiery	Mischief
Biennium	Fierce	

Words involving the letter combination **GH**

Dough	Ghost	Naught
Ghastly	Height	Though
Ghetto	High	

Words involving the letter combination **OA**

Boar	Goat	
Board	Load	
Boarder	Loaf	
Boast	Loan	
Boat	Loath	
Float		

Words involving the letter combination **OO**

Flood	Goose	Loop
Blood	Groom	Loose
Good	Groove	Loot
Floor	Moon	Mooch
Fool	Hook	Mood
Foot	Hoop	Moon
Gloomy	Hoot Kangaroo	Moor
Goofy	Look	Moot

Words involving the letter combination **OU**

About	Famous	House
Bout	Found	Housing
Capricious	Fountain	Humorous
Compound	Four	Thousand
Count	Fount	Soul
Country	Fugacious	Jelous
Coup	Gouache	Journal
Couple	Gracious	Journey
Courage	Gregarious	Joust
Court	Greyhound	Louse
Crapulous	Ground	Miscellaneous
Denounce	Harbour	Mound
Devout	Harmonious	Mount
Dipterous	Heinous	Mountain
Double	Hideous	Mourn
Doubtful	Hilarious	Mousse
Facetious	Homologous	Mucous
Factionous	Hour	

Words involving the letter combination **OUGH**

Borough	Boughten	Dough
Bough	Brougham	Enough
Bought	Brought	Fought

Words involving the letter combination **OUS**

Exiguous	Invidious	Mucous
Expeditious	Jounce	
Impetuous	Mousse	

Words involving the letter combination **SION**

Expansion	Expression	Invasion
Explosion	Impression	Inversion

Words involving the letter combination **SS**

Loss	Messenger	Mission
Massage	Messmate	Missionary
Message	Miss	Mistress

Words involving the letter combination **THER**

Gather	Mother	
Megatherium	Father	

Words involving the letter combination **TION**

Action	Donation	Exposition
Addiction	Election	Extortion
Attention	Evolution	Fiction
Caution	Examination	Flotation
Condition	Excavation	Formation
Confederation	Exception	Foundation
Conventional	Extinction	Function
Creation	Exclusion	Generalization

Motion	Imposition	Injection
Hallucination	Incarnation	Innovation
Exhaustion Ideation	Inclination	Interpretation
Imitation	Infection	Intervention
Immigration	Information	
Implication	Initiation	

Decoding:

The ability to recognize letters in situations involving common words as well as non-words

Exercise #1:

Write a letter on a large piece of paper or the board. Tell the learner what letter it is and ask that the learner repeats the name of the letter out loud.

Introduce both the capital letter and its script version at one time. Make sure that when introducing a new letter its capital version should be presented to the left of its script version as such:

A a

Slowly, begin to add letters one at a time until ten letters are taught.

Exercise #2:

Present two or three letters in a written form, but this time separate the capital from its script version as

h g
b B
G H

such.

Ask the learner to name out loud each letter and identify if it is script or a capital letter. If the student have difficulty naming the letters, introduce each letter once again and ask the learner to repeat each letter name.

Exercise #3:

Present two or three capital letters in a written form. Ask the learner to call out the letter names. Do the same with the letters' script form while presented in a different order. It is important that these letter are presented individually (with lots of space between them) as such:

A C
F

Exercise #4:

Teach five letters at a time. Repeat exercises #1, 2 and 3 until all letters are learned and the learner is able to call out loud the names of both the capital and script version of each letter.

Exercise #5:

Present a combination of two letters in a written form. Ask the learner to call out loud the name of each letter. Do this for both capital and script verses of each letter. It is recommended that you use combination of letter that are recognized words in the English language as well as combination of letters that create non-words.

Exercise #6:

Repeat exercise #5 with a combination of three letters.

Exercise #7:

Repeat exercise #5 with a combination of four letters.

Exercise #8:

Repeat exercise #5 with a combination of five letters.

Exercise #9:

Repeat exercise #5 with a combination of six and more letters.

Letter and Vowels Relationships

The relationship between letters and vowels is clear in some cases and obscure in others. The goal of the following exercise is to make all of these relationships clear.

Exercise #1:

Goal: teach the letter vowel combination OUGH as in the words TOUGH and DOUGH.

Write the letters O, U, G and H in order on a large paper. Ask students to put together all four kinesthetic transitions that represent the letters O, U, G and H. Have the learner repeat that combination three to five times. Continue by adding the letter T before the letters O, U, G, and H. Say the word out loud. Ask the learner to explain what it means and give an example.

Instruct the learner to add a movement before the existing combination of OUGH so to receive a sequence that represents the word TOUGH. It is very important that the letter representing the T mirror images it, and that the execution of the entire sequence expresses the meaning of the word. Have the child repeat the sequence of the word three to five times.

Do the same with the word DOUGH. Find other words that end with the letter OUGH. See the list below for additional words that include this letter combination.

Repeat exercise number one with each of the following letter combinations:

AU
CK
EA, EAU, EE, EI,
IE
GH
OA, OO, OU, OUGH, OUS
SION, SS
THER, TION

Below is an alphabetical listing of words for each letter combination. Teaching the words should be done in consultation with grade letter curriculum and difficulty order. A successful kinesthetic teaching will provide the learners with enough time to create dances that represent the spelling of each word in addition to allowing learners to create a story context or association in which to place each word.

Encoding:

The ability to remember each letter of the alphabet. Encoding exercises should be done after the phonological and decoding exercises were well rehearsed. Encoding exercises should follow the format presented below. It is recommended that single letters are presented first followed by two, three, four and five letters which will be presented at one time.

- 1) Present a letter in a written form. Don't say what it is.
- 2) Ask the learner to identify the name of the letter.
- 3) If the learner is unable to recall the name of the letter, ask the learner to present the kinesthetic sequence that represents that letter.
- 4) If the learner still is unable to recall the name of the letter, ask the learner to continually present the kinesthetic sequence while thinking of the associations made to that letter. The learner should be asked to also perform the kinesthetic sequence in a way that expresses the meaning of the letter.

Visual and Verbal Memory

The ability to remember letters' shape and how they are pronounced. The following exercises are presented in difficulty order (from simple to complex), thus should be followed carefully. The process for all of the exercises is the same:

- 1) Introduce a letter. Say its name out loud. Annunciate its pronunciation slowly and have the learner repeat that process out loud.
- 2) Ask the learner to create a kinesthetic transition that represents that letter. The kinesthetic transition should be drawn from the learner's world of imagination or association. It is important for the learner to explain the way in which the kinesthetic progression in space represents the way in which the letter is written. The kinesthetic transition should be repeated in space about 10 times.
- 3) Ask the learner to both perform the kinesthetic transition while simultaneously pronounce out loud the letter's sounding.
- 4) Use flash cards (4x5 color flash cards are recommended) to write the letters on, and give them to the learner to identify for name and pronunciation.
- 5) In order to advance the learner experience, the facilitator should ask the learner to think of words that include the letter or letter-combinations that are taught in each of the following exercises.
- 6) The facilitator pronounce a letter or a letter-combination and the learner needs to identify which letter or letter-combination is given. In this stage, the facilitator should encourage the learner to use the kinesthetic mode as a tool for reminding the shape and sounds of letters.

Exercise #1:

Introduce the vowels one at a time (i.e., *A, E, I, O* and *U*).

Exercise #2:

Introduce combinations of consonants and vowels one at a time. Common consonant-vowel letter combinations are: *Bo, Ca, Da, Mo, Pi, Lo, Mi*.

Exercise #3:

Introduce two-letter combinations. Common two-letter combinations are: *AU, CK, EA, EAU, EE, EI, IE, GH, OA, OO, OU* and *SS*.

Exercise #4:

Introduce three-letter sequences. Common three-letter combinations are: *OUGH, OUS, SION, THER*, and *TION*.

Pronunciation

The ability to fully sound out written information. The following exercises are presented in difficulty order (from simple to complex), thus should be followed carefully. The process for all of the exercises is the same:

- 1) Introduce a letter. Say its name out loud. Annunciate the name of the letter and its sounding slowly and have the learner repeat that process out loud.
- 2) Ask the learner to create a kinesthetic transition that represents that letter. The kinesthetic transition should be drawn from the learner's world of imagination or association. It is important that the learner explains in what way the kinesthetic progression in space represents the pronunciation of the letter. The kinesthetic transition should be repeated in space about 10 times.
- 3) Ask the learner to both perform the kinesthetic transition while simultaneously pronouncing out loud the letter's sounding.
- 4) Use flash cards (4x5 color flash cards are recommended) to write the letters on, and give them to the learner to identify for pronunciation.

Fine motor skills:

Fine motor skills are constituted by small muscle groups such as those located in the fingers and toes. Writing abilities (clear and efficient) are constituted by fine muscles of the palm. A child who does not have the muscle tone to hold a pencil, or the skill to operate the pencil, will have difficulty demonstrating knowledge on written tests.

The ability to use the fine muscles of the hand and especially the palm and fingers in order to write efficiently. This skill is very important as knowledge is often measured on written tests. Fine motor skills can be improved with kinesthetic exercises and the more practice the greater the chance that the skill will improve. The following exercises should be done on a regular basis until the fine muscles in the palm strengthen. The methodology of executing these exercises should allow the learner to do as much as he or she can the first time around, with as many repetitions as they can handle. Two or three exercises should be introduced first, and no more exercises should be introduced until all ten repetitions in all of the first three exercises are achieved.

Exercise #1:

Ask the learner to lay the palm flat on a table with the fingers close together. Ask that the learner spreads the fingers apart as much as possible and relax the fingers in this position. Instruct the learner to tighten the muscles of the fingers while in this spread apart position. Repeat the relaxation and tightening of the muscles ten times. The first ten repetitions should be done with the left palm. The second ten repetitions should be done with the right palm. The third ten repetitions should be done with both hands simultaneously.

Exercise #2:

Ask the learner to lay the palm flat on a table with the fingers close together. Instruct the learner to relax the fingers in this position. Instruct the learner to tighten the muscles of the fingers while in this position. Repeat the relaxation and tightening of the muscles 10 times. The first ten repetitions should be done with the left palm. The second ten repetitions should be done with the right palm. The third ten repetitions should be done with both hands simultaneously.

Exercise #3:

Ask a child to place the palm flat on the table with the fingers close together. Instruct the child to lift all fingers off the table and hold for ten seconds, then relax the fingers and place them on the table once again. The first ten repetitions should be done with the left palm. The second ten repetitions should be done with the right palm. The third ten repetitions should be done with both hands simultaneously.

Exercise #4:

Ask the learner to place the palm flat on the table with the fingers spread apart as much as possible. Instruct the learner to lift all fingers off the table and hold for ten seconds, then relax the fingers and place them on the table once again. The first ten repetitions should be done with the left palm. The second ten repetitions should be done with the right palm. The third ten repetitions should be done with both hands simultaneously.

Exercise #5:

Ask the learner to place the palm flat on the table with the fingers spread apart as much as possible. Instruct the child to lift up each finger at a time and hold it in the air for ten counts, then relax it by placing it on the table. Each finger should repeat the lifting of the table ten times. Begin by working on the left palm. Repeat with the right palm then repeat with both palms simultaneously.

Exercise #6:

Ask the learner to place the palm flat on the table with the fingers tight together as much as possible. Instruct the child to lift up each finger at a time and hold it in the air for ten counts, then relax it by placing it on the table. Each finger should repeat the lifting of the table ten times. Begin by working on the left palm. Repeat with the right palm then repeat with both palms simultaneously.

Exercise #7:

Instruct the learner to place the fingers so that they face each other. The fingers should touch gently. Instruct the child to push the fingers into each other as hard as possible, and relax without letting go. Repeat ten times.

Exercise #8: (should be done while laying face down on the floor)

Instruct the learner to place the palm facing down while fingers are spread straight and wide as they touch the floor next to the shoulders. Instruct to push the entire body up off the floor 2 inches and hold for ten counts. Repeat ten times.

Exercise #9: (to be done while laying on the floor face down)

Instruct the learner to place the palm facing down while the fingers are spread straight and wide as they touch the floor next to the shoulders. Instruct to lift the base of the palm off the floor 1 inch, then push the entire body up off the floor 2 inches and hold for ten counts. Repeat ten times.

Exercise #10: (to be done while laying on the floor face down)

Instruct the learner to place the palm facing down while the fingers are spread straight and wide as they touch the floor next to the shoulders. Instruct the learner to lift the entire palm off the floor while keeping the fingers touching the floor. This will create a mini tent like shape. Instruct to push the entire body up off the floor 1 inch and hold for ten counts. Repeat ten times.

Exercise #11:

Take a pencil and draw slowly each letter of the alphabet. Repeat writing each letter with both the right hand and the left hand for ten times. Practicing the writing with both hands is very important as it develops the brain as well as muscles abilities to visualize and execute the letters correctly.

Large Motor Skills

The ability to use large muscles of the body and especially the arms to write effectively. Skills involving stable writing require muscle tone to be such that is able to support the upper arm, lower arm, wrist, torso and legs. Learners sometime struggle with writing because their muscle tone is so low that it does not allow them to sit properly and write in a stable manner. The end result is a sloppy and uneven hand-writing. The following exercises are designed to strengthen each and every of the body parts that were mentioned above and each exercise include a description of its purpose, i.e., the body part that it is meant to strengthen.

A good rule in doing these exercises is to begging with one set (which include 10 repetitions) of each of the exercises given below. The next difficulty level would be achieved by adding a second set to each of the exercises. Continue to add sets until 6 sets of each of the exercises can be performed. It is a goo idea to add sets in one-week intervals, while practicing an entire sequence 5 days of the week.

Torso Exercises

Having a strong torso is very important for variety of reasons the least of which is health reasons. Strong torso can also greatly improve a learner's ability to write efficiently as it is the torso that carries the limbs and as such it allows for a free movement of the arms during the writing process. The following section includes specific exercises dedicated to different parts of the torso, upper, middle and lower.

Upper Torso Exercises

Exercise #12: (to be done while laying on the floor face down)

Place palms right next to armpits and push only the upper back up and lower down to the floor.

Exercise #13: (to be done while laying on the floor face up)

Bring scapulas together while arching the upper back and relax.

Exercise #14: (to be done while laying on the floor face down)

Lift your upper back diagonally forward (until only your middle and lower back touch the floor) and lower slowly.

Middle Torso Exercises

Exercise #14: (to be done while laying facing down.)

Place palms next to armpit. Lift one leg up in the air and lower. Alternate legs.

Exercise #14: (to be done while leaning on a low stool.)

Lower the upper torso below the pelvic line and raise it to align upper and lower torso into a straight line.

Exercise #14: (to be done while leaning with one hip on a side of a table or a wall)

Bending lower to the side and recovering to the starting position. Change sides to workout the other side of the middle torso.

Exercise #14: (to be done while assuming a "dog" pose, on all "four")

Curve your entire back, hold for three seconds while exhaling and arch the back slowly. Avoid pushing into the vertebrae instead allow the force of gravity to help you stretch your back. Emphasize the pulling of the middle back up and down.

Lower Torso Exercises

Exercise #14: (to be done while laying down face up with legs bent and your feet flat on the floor)

Lift your entire body off the floor as you pull towards your legs stay for 3 seconds and slowly come back to starting position.

Exercise #14: repeat previous exercise with legs straight on the floor.

Exercise #14:

(to be done while laying down face up and both legs slightly bent resting right over the stomach.)

Lift the pelvic off the floor and lower slowly.

Exercise #14: (to be done while laying down face up with legs bent resting right over the stomach.)

Lower legs slightly and bring back to starting position. Repeat the lowering and recovering while each time reducing the height of the legs. It is important to make sure that while legs are lowered to the floor, the lower back is kept touching the floor. This can be achieved by thinking of "glueing" the lower back to the floor.

Exercise #14: (to be done while assuming a "dog" pose, on all "four")

Curve your entire back, hold for three seconds while exhaling and arch the back slowly. Avoid pushing into the vertebrae instead allow the force of gravity to help you stretch your back. Emphasize the pulling of the lower back up and down.

Upper Arm Exercises

Strengthening the upper arm is essential in achieving a good balance of the arm over the page. The following strengthening exercises are designed to be done daily.

Exercise #14: (to be done sitting upright on a chair)

Hold a 12 oz. Weight (or a food can). Starting position: arm lays in its natural position along side the body. Raise just the lower arm while the fist faces you and lower. Change hands.

Exercise #14: repeat the previous exercise with the fist facing away from you. Change hands.

Exercise #14: repeat the previous exercise with the thumb facing to you. Change hands.

Exercise #14: (to be done sitting upright on a chair.)

Starting position: elbows bent fists facing away from you, holding 12oz. Weights. Press both arms up (elbows should be touching close to the ears) and recover to the starting position.

Exercise #14: repeat the previous exercise with the fists facing towards you.

Exercise #14: repeat the previous exercise with the fists facing each other.

Lower Arm Exercises

Lower arm strength plays a pivotal role in ensuring the stability of the arm in the writing process. The following exercises will help the learner to gain a greater stability of the lower arm muscles.

Exercise #14: (to be done standing 1 foot away from the wall and leaning on it with elbows close to ribs.) Push the entire body as one piece away from the wall and return to starting position.

Exercise #14: repeat the previous exercise standing 2 feet away from the wall.

Exercise #14: repeat the previous exercise standing 3 feet away from the wall.

Exercise #14: repeat the previous exercise standing 3 feet away from the wall.

Exercise #14: (to be done sitting in a chair while the arms are placed on a table or otherwise a flat surface. Tighten the muscles of the lower arm and relax. Changes arms.

Exercise #14: repeat the previous exercise with both hands tightening and relaxing simultaneously.

Wrist Strengthening Exercises

Wrist coordination and strength is required to ensure the stability of the writing style. The following exercises should be done daily.

Exercise #14: (to be done standing close to a wall leaning into it).

A one-foot distance is recommended to start.

Press the wrists off the wall and return to starting position.

Exercise #14: repeat the previous exercise while standing 2 feet away from the wall.

Exercise #14: repeat the previous exercise while standing 3 feet away from the wall.

Exercise #14: repeat the previous exercise while standing 4 feet away from the wall.

Legs Strengthening Exercises

Leg strength is necessary to help stabilize the body while the writing action takes place. The following exercises are designed to increase general muscle tone in the legs.

Exercise #15:

(to be done while leaning against a wall facing away from it, feet 3 feet away from the wall and about 3 feet wide.)

Begin bending until a 90° is created between thigh and shin. Return to starting position.

Exercise #16: (to be done in a natural standing position with feet 2 feet apart.)

Begin bending knees slightly then return to standing position. Make sure that during the bending process the knees remain over the feet.

Exercise #16: repeat the previous exercise with feet together.

Make sure that during the bending process the knees remain over the feet.

Exercise #16: (to be done in a natural standing position with feet 2 feet apart.)

Begin raising you body so that your entire body weight is on your ball of your feet. Lower your self slowly back to the starting position.

Exercise #16: repeat the above exercise with feet together.

Chapter VI. Kinesthetic Instruction in the Teaching of Spelling

Introduction

Learning to spell requires the ability to remember letter combinations. The kinesthetic process is the strongest hands-on methods that helps all children enhance their spelling level. The process presented below reflects the belief that successful implementation of alternative instructional strategies can only be achieved by grounding meaningful learning in a primal sensory experience. The kinesthetic process requires an emotional engagement expressed through a whole body movement in space. This was found to have positive effects on students' academic achievement in the areas of spelling, reading and writing, in addition to have positive effects on students' behaviors, attitudes for learning and motivation for succeeding in school. This kinesthetic process is also assumed to help in the creation of new neurological structures that facilitate better learning through visual and auditory channels which helped in areas beyond spelling, reading and writing.

A successful completion of the kinesthetic process will enable the learner to strengthen all of the following skills:

1. The inability to remember shapes (in this case letters);
2. The inability to remember letter sequences; and
3. The inability to remain still for long periods of time while listening and watching.

The kinesthetic process is achieved by facilitating creative movement segments, which require students to think about the meaning of letters, letter-combinations and words, and explore those meanings through dance and movement in space. The process also includes vocabulary exploration that occurs in one of three ways: individually, as a whole class activity or small group discussions. This approach helps learners to:

1. Find meaningful associations that serve as cues for recognizing letters' shape;
3. Develop meaningful associations that help describe the order of letters in words;
4. Build new neurological connections that serve as clues for remembering letters' shape, letter combinations, meanings of words and correct spelling of words;
5. Experience learning through energetic movement;
6. Express oneself by creating personal movements in space;
7. Use excessive energies in a positive and productive manner throughout every learning period.

Finding meaningful associations (and ways to describe them in words) is essential in order for the kinesthetic process to be successful. This process does not involve rote memorization, as is done traditionally with repetitive writing of words, or when a teacher dictates movements for students to repeat. Instead, the emphasis is placed on finding connections that are meaningful to the learners, i.e., connections

that have significant emotional impact. This is done by asking the learners to build on their own (already gained) life experiences, that have made an impression on them (good or bad). These experiences become the foundation for new acquired knowledge (sensory as well as explicit) which is then expressed verbally through discussion.

Learning to spell as facilitated by the kinesthetic process requires the implementation of a particular lesson structure that calls for four layers and is done in eight stages. Facilitating the layers and stages should be synchronized and should be followed carefully.

First Layer: establishing a basic kinesthetic memory

- 1) A word is introduced, for example, MOTHER. The teacher writes the word on the black board, but does not direct attention to the written word.
- 2) The teacher asks students to dance each letter in the word. The teacher models the correct writing of each letter simultaneously to stating out loud the direction of progression of each letter. Students are explained that they are expected to dance each letter as it is stated by the teacher (who reads the letters in the order they appear in the word). The teacher encourages students to "perform" each letter with different body parts.

It is important for the teacher to emphasize that students are to "perform" each letter in the same direction that it is written. For example, the capital letter M is written from left to right, bottom to top, down and up, then down. Whichever body-part executes the letter M, should be moved in these exact directions. This helps establish a kinesthetic memory of the shape of each letter, which is created by the presence of sensations generated through the body's motion in space.

Each letter should be danced numerous times (which requires the teacher to repeat reading the entire word several times) until students are able to perform the letters in space without looking at the written letters. Repeating each letter several times creates the opportunity for students to try different body-part execution of each letter. The teacher should instruct students to make a final choice regarding the particular execution of each letter which will be applied also in future words containing these same letters.

- 3) The teacher asks students to write each letter on paper. The teacher directs students to close their eyes and imagine their bodies moving in space as they write each letter on the paper.

Second Layer: enhancing the kinesthetic memory through meaningful associations

- 4) Next, the teacher asks students to call out associations/ characteristics to the word written on the board. The teacher adds those associative words around the original word, and makes sure that the added words are in a different color than the word MOTHER.
- 5) The teacher asks students to put together a story that will convey the meaning of the given word, expressed through dance. The story should reflect both the order of the letters in the word MOTHER as well as the characteristics of that mother, such as her qualities, something she did or said, or made one feel or think.

The teacher reminds students that they can use the associative words on the board for this purpose. It is preferable that each letter danced is followed by an associative word that begins with that same letter (other associative words beginning with different letters can be added next). This process reinforces the order of the letters that compose a given word as well as the meaning of the word.

Learning to spell the word MOTHER for example, would result in a MOTHER dance that should

include the movement that represent the first letter of the word and immediately following all other movements that reflect its associative words or its story. This is done for each letter of the word according to its correct spelling. Many times, students choose to add movements to convey the complete story associated with the letter/word. Other times, the way in which the students perform each letter conveys the story or meaning of the associative words which is achieved by students using different energies and qualities to their movements.

The teacher instructs students to enact each letter and all related dance moves only in motion; that is, no voices are allowed for exposition. This helps students to use their energies in a fuller way, to express the meaning of the word learned through movement and dance. A direct result of that stage is a stronger sensory stimuli that is tied to the evolving kinesthetic memory.

However, if a child intuitively says aloud each letter as he or she dances the word, or if a child decides to simultaneously tell the story of the word as he or she dances it, the teacher should allow the child to proceed. Such an instance demonstrates that the child needs to hear the letters in order to remember them, which enhances the evolving memory and improved spelling skills. In addition, allowing students to say aloud the letters (if they request it) develops a critical ability to connect the way letters are written with the way they sound.

Third Layer: reinforcing kinesthetic memory

Students are asked to rehearse their word dances several times in preparation for performing for the entire class.

- 6) After students practice, they are asked to close their eyes, stand or sit still, and envision themselves dance their complete word dances. The teacher asks students if they are able to envision their bodies dancing the entire word, beginning to end. If students indicate that they are not able to "see" themselves dancing the entire word, they are given time to repeat their dances while thinking slowly about the shapes of the letters involved, the story of the word and its meaning.
- 7) The teacher conducts a class presentation that allows each child or group of children to demonstrate their dances. In early stages of implementing the choreographic approach, some students might be hesitant to perform their word dance alone in front of the entire class. In such cases, students should be grouped to perform together each their own dance (pending on the availability of space in the classroom) so they feel more supportive of their fellow students who are dancing with them. Students should be asked after they finished their performance to explain to the class how each letter in the word was represented kinesthetically and what the word means to them.

Fourth Layer: transferring kinesthetic memory into visual and written form

- 8) The teacher asks students to write the word MOTHER, without performing their word dance. Some students become hesitant or fearful at this point, since they are accustomed to failing when learning is measured by their writing on paper. Teachers responses are crucial at this point as positive and relaxed response would help students gain confidence in their ability to spell correctly, while an impatient response would lead students to develop feelings of failure. The teacher might say in a relaxed calm tone, "Close your eyes, and imagine yourself dancing your MOTHER dance. Can you see each letter evolving? Think of one letter at a time. Write each letter slowly. Take your time, there is no rush. I know you can do it, I've seen you dance it."

When learners are new to this process and are not yet able to “see” them selves dancing with eyes closed, they should be instructed to dance their word dance several more times. They should be encouraged to say the name of each letter to themselves, tell the story they created for the word, or any other method that helps them regenerate the order of letters in that word. They are asked to write each letter as they remember it. The teacher can help further by saying, “Don’t pay attention to anything else, just focus on your dance.” This is important because some children are very susceptible to peer pressure, or develop anxiety in the presence of other children.

Chapter VII. KTM solves Anger Management

Introduction

Anger is an emotion that reflect the state of mind of frustration, disappointment, aggravation and disagreement. Children who continually feel that they are not understood or that they are not able to communicate effectively with the world, become angry and angry feelings are expressed in a variety of unpleasant ways for both child and surrounding.

Language expressions of anger can include but are not limited to sarcasm, cynicism, the use of bad words, shouting, yelling and screaming. Body language expressions of anger can include but are not limited to sharp body’s motions in space, very forceful actions towards objects, self or other individuals. Examples of these can include but are not limited to hitting others, throwing one’s body on walls and objects, slamming feet into the floor and kicking.

Managing a child’s anger begins by understanding the child’s point of view, that is, “I am not understood, no one listens to me and no one cares.” Understanding this position will help teachers, parents and professionals to better teach and work with angry children.

Coupled with the exercises that are presented in this chapter it is recommended that parents of an angry child make time to spend wit the child doing fun things. Anger usually builds up when a person feels that everyone else has something fun to do except them. The key is finding an activity or activities that capture the individuals’ interest so that they are busy doing something of interest to them as well as something that makes them feel good about themselves.

Examples of recommended activities is presented below: Remember, participating and doing is preferable over passive participation like watching TV. Thus the participation in all of the following is recommended:

- a variety of ice sports and recreational activities;
- pool games and classes;
- art classes and projects;
- volunteering in outdoor places such as parks and recreation facilities;
- reading books and playing board games; and
- taking music classes, attending live concerts and art shows.

Anger management kinesthetic program--Goals

The goal of the anger management kinesthetic program is to help teachers, professionals and parents be able to use the kinesthetic process and the activities it offers to reduce children’s anger levels. Specific goals are to:

- 1) Help teachers, professionals and parents learn the kinesthetic methods for helping children reduce their anger levels.

- 2) Help children acquire a greater vocabulary, which they can use to express their needs, thoughts and desires both kinesthetically and verbally.
- 3) Help children acquire a greater kinesthetic experience, which they can use to express themselves emotionally, relief excessive energies and gain control over their body's energies and motion in space.

Anger management kinesthetic program--Objectives

The anger management kinesthetic program have clear objectives which are:

- 1) Help teachers, professionals and parents to be able to facilitate kinesthetic base activities designed to reduce children's anger levels.
- 2) Lead children through the acquisition of a greater vocabulary, which they could use to express their needs, thoughts and desires.
- 3) Teach children to ways the kinesthetic experience can help them to express themselves emotionally, relief excessive energies, and gain control over their body's energies and motion in space.

All of these objectives are obtainable if the program is followed daily for about ten to fifteen minutes segments. It is recommended to begin the activities with a facilitator and depending on the child's maturity and readiness level to move onto the child performing the exercises alone.

Facilitating Principles

Understanding an angry person's point of view is key in working with him or her in a successful and productive manner. Facilitating the kinesthetic model for anger management requires applying all of the following key strategies:

- 1) Take your time with a learner. Give them enough time to express themselves. Never be on a rush or rush them to produce the results you desire.
- 2) Always talk to them when they are close to you. Never communicate across rooms, tables or hallways.
- 3) Always lower yourself down if you are talking with a child so that you are at their eye level, and always make eye contact while you attempt to have a conversation with a person.
- 4) Make sure that your tone of voice is reassuring and firm.
- 5) If a child lacks words, offer a word that describes what you see is happening.

A successful process calls for using different exercises, each of which is designed to address one aspect of the anger. It is important to facilitate the different exercises in the order presented so that the learner is gaining tools for understanding and expressing the reasons for their anger before they are asked to execute exercises that address anger symptoms. Anger management exercises include four groups each of which addresses a different aspect of the anger.

Anger Management Exercises

- 1) Exercises that relief excessive energies
- 2) Exercises that enhance motor control
- 3) Exercises that enrich vocabulary
- 4) Exercises that help self-expression

Please note that some exercises also include a "how to facilitate" section which is included to help facilitators plays a pivotal role in the learner's progression.

Exercises for Relieving Excessive Energies

A major component of anger is the accumulation of excessive energies that normally could not be acted upon in the regular classroom (one that requires quiet sitting for long periods of time). This group of exercises can be done at home, on the street, in the school hallways and in outdoor places.

Activity #1:

Instruct the learner to jump in place for 10 seconds, and then freeze. Repeat this 10 times. At the end of the last repetition, instruct the learner to strongly tight his or her fists, hold that strong fist for about 10 seconds and gradually release the tension in the fists until the palm is completely relaxed. Repeat the exercise five times.

How to facilitate?

- 1) As repetitions increase, encourage the learner to continue by saying "well done", or "don't give up", or "you are almost there."
- 2) At no stage of this activity, a learner should be allowed to throw their body in space, or make sharp movements. This exercise should be performed running in one place.

Activity #2:

Instruct the learner to choose and perform in space four large sharp moves that travel significantly in space. After completion, instruct the learner to stand with feet close together, and in a "slow motion" style arrive at a squatting position and back to standing upright. Repeat five times.

How to facilitate?

- 1) Require the learner to remember the four large movements in space. Reinforce the importance of performing the large movements exactly the same in each repetition.
- 2) Remind the learner to move as large, big and sharp as they can.
- 3) Provide positive reinforcement and praise for their execution.
- 4) Be clear that the slow motion lowering of the body to the floor should be done with a very quiet body state. This means no sharp moves should be done at any time during the exercises is taking place, no talking or jittering.
- 5) Emphasize concentration on one's breathing and control over the evolving motion.

Activity #3:

Instruct the learner to stand against a wall with the feet about two steps away from the wall. Only the learner's back and behind should touch the wall. Instruct the learner to slowly begin to slide down the wall until there is a 90° between their shin and thigh. This position should be held for as long as possible. Repeat five times.

How to facilitate?

- 1) Encourage the learner to stay longer each time they arrive at the 90° position.
- 2) Praise the learner for good execution and encourage the learner to hang in there when he or she indicates that they are about to collapse.
- 3) Stress that it is important to slide back up to a standing position *slowly*.

Activity #4:

Stand facing your learner about 3 steps apart. Place your palms so that they face each other. Begin leaning towards each other until the palms touch. Continue pressing against each other's palms for about twenty seconds and recover to the original beginning position slowly.

How to facilitate?

- 1) Explain to the learner prior to beginning this activity that the goal is to create a balanced position rather than tipping each other over.
- 2) Make sure that both of you move slowly so that you are able to manage accurately your body's alignment, amount of energy and balance.
- 3) Make sure that you press against each other with elbows bent, fingers must be closed together and the pressure to push out should come from the fingers.

Activity #5:

Instruct a learner to choose and perform in space 3 fast moves and one slow movement. Ask the learner to repeat the sequence 10 times.

How to facilitate?

- 1) Insist that the learner remembers the sequence. (This might require writing down the movements as sketches, drawings or words.)
- 2) Encourage the student to complete each of the ten repetitions as they increase. Encouragement can be done by providing general reinforcement such as "good job, nicely done", or by giving specific assistance such as "don't forget to exhale on your fast moves" or "thinking what comes next helps."
- 3) Continually remind the learner that the execution of the sequence should be done with intent, that is, sharp movement should be performed in a sharp manner while slow movements should be performed as if in a "slow motion" mode.

Home Application

Parents, Supervising adults, and family members could help a child do these exercises at home. The exercises can be done in any room, either as a "solo" performance of the child or a "group performance", that is, the child will do all the exercises with all the other children in the house or facilitating adults. The more positive encouragement a child gets the greater the chances that they will be willing to do the exercises.

An ideas situation is when an adult is doing the exercises with the child, as silly or embarrassing this might be for the adult. But, this provides a child an example that all there exercises can be done, and are fun to do. Eventually, the child will be asking to do the exercises and demonstrate on their own.

School Application

Use a quiet time to work alone with a child in a private place like an unused classroom. Teach the child the exercises that appear in the **Exercises that Relief Excessive Energies** section. Try to reach a point where the child knows the exercises and can do them on its own. Discuss with the child the options of him or her leaving the classroom for a minute or two to the hallway if they feel that they need to do these exercises during desk-work. Also, discuss with the child's teacher the possibility of the child going to the back of the room quietly to do these exercises.

It is important to talk with the child's teacher and let them know of the kinesthetic strategy that is being developed and ask for their understanding and cooperation. If it is decided that the child could go to the back of the room to do the kinesthetic exercises, it is most important to share with the other children in the class what is going on and why, so that they too cooperate.

Chapter VIII. Kinesthetic Instruction for Gaining Body Control

Introduction

Gaining body control is an important aspect of daily smooth functioning. Body control is the ability to navigate through space without the interruptions of sudden, sharp, forceful movements that can harm one-self or others.

The goal of the exercises in this chapter is to help increase body control by improving spatial awareness, coordination, eye-body motor relations and energy management. The objective is to increase the body's ability to better manage its motions in space through an understanding of one's motions and energies.

The chapter includes two types of activities, those that can be done alone and those that require a second person. Executing the activities should be done in the order in which they are presented, as they are written according to difficulty order. Improving one's body control will best be obtained if implementation of these exercises takes place each day, for a period of about ten to fifteen minutes. It is advisable to begin with the first exercise and repeat it between five and ten times before going on to the next.

Both body's strength and control can be dramatically improved. It is key, however, to work up to your abilities. If an exercise is difficult, do as much as you can and stop. Rest. Try again. Repetitions over time will bring upon improvement.

On Your Own Exercises

All of the following exercises could and should be done alone. Daily repetitions and persistence will dramatically increase body control, spatial awareness, strength, and sensitivity to gentle mobility in space. A person should notice a significant improvement in the manner in which one moves throughout space within a short period of time.

Exercise #1:

Lean on a wall with feet slightly distant from the wall. Stand with feet slightly apart and let your hands hang to the side of your body. Begin bending your knees, continue to lower your height while keeping your torso as upright as possible. When you can't go any further stop and count from 21 to 25. Recover slowly.

What to watch for?

During the execution of this exercise make sure that:

- * Your lower back is not arched;
- * Your lower back is not tucked in;
- * You keep lifting your stomach muscles up;
- * You inhale and exhale normally;
- * Your speed is slow both going down and coming back up;
- * You do not relax your muscles at the middle of the exercise. If you can't go any lower (or feel fatigue) begin to raise your height by straightening your knees.

Exercise #2:

Repeat the previous exercise but this time stand so that your feet are two feet width away from the wall

Exercise #3:

Repeat the previous exercise but this time reach your hands straight in front of your chest.

Exercise #4:

Stand an arm distance from the wall while facing profile to the wall. Bend on leg and lift it up. Find your balance. Keep the leg in the air while counting 21 through 25. Lower your leg slowly when you are done. Repeat with the other leg.

What to watch for?

During the execution of this exercise make sure that:

- * Your torso is pulled up;
- * Your stomach is pulled up;
- * You exhale and inhale freely;
- * Your supporting leg (the one you stand on) is pulling you up.

Exercise #5:

Stand in one place, and begin moving one arm in space creating an imaginary figure eight. Do it slowly. Repeat with the other arm.

What to watch for?

During the execution of this exercise make sure that:

- * You are inhaling and exhaling freely;
- * Your legs are firm supporting you to the ground;
- * You are pulling your stomach up;
- * You are pulling your torso up high.

Exercise #6:

Stand with feet slightly apart, keep your hands to the sides of your body. Begin bending your knees, continue to lower your height while keeping your torso as upright as possible. While you lower your height, begin to draw a figure eight with both of your arms in the air. Continue the arms' circulating motion in space until you have returned to a standing position.

What to watch for?

During the execution of this exercise make sure that:

- * Your lower back is not arched;
- * Your lower back is not tucked in;
- * You keep lifting your stomach muscles up;
- * You inhale and exhale freely;
- * Your speed is slow both going down and coming back up;
- * You do not relax your muscles at the middle of the exercise. If you can't go any lower (or feel fatigue) begin to raise your height by straightening your knees.

Exercise #7:

(to be done in a place where you can walk for about 5 minutes straight forward.)

Stand straight. Let your arms drop to the side of your body. Remain motionless. Breath slowly. Begin walking forward. Take 10 steps. At the 11 step begin to raise both arms straight in front of your body. Continue walking as the arms are raised up, once the arms have reached over the head position, bring them down slowly to their starting position. Continue walking *slowly* throughout the entire time the arms are in motion. Stop walking 10 steps after the arms have done one raise and lower in space.

What to watch for?

During the execution of this exercise make sure that:

- You breath smoothly and easily throughout the exercise;
- You are aware of your arms' pace relative to the steps you are taking;
- You are able to concentrate both on the arms' motion as well as the walking;
- You are able to count the steps and focus on the arms and legs motion;
- You are able to create a slow and balanced arms movements in space;
- You are able to notice your surroundings in your peripheral vision

Exercise #8:

Repeat the previous exercise with arms that spread to the sides.

Exercise #9:

Repeat the previous exercise with one arm creating an imaginary figure eight shape in space in front of the body. Repeat with the other arm.

Exercise #10:

Repeat the previous exercise with both arms creating an imaginary figure eight shape in space in front of the body.

Dictionary of Terms

Addend	Any number is an addend.
Additive identity:	the addition of the addend zero to another addend does not affect the first addend. For example adding a zero to the number 3 sums three.
Associative property:	Adding three or more addends does not affect the sum. For example: $(3 + 5) + 2 = 3 + (5 + 2)$
Commutative property:	Changing the order of addends does not affect the sum. For example $3 + 4 = 4 + 3$.
Difference:	the result of subtracting one number from another.
Kinesthetic:	movement that is created with the human body.
Meter:	A set sound that provides a steady count for time. An example for a meter is the heart beat. A meter can be fast, slow or moderate as long as it is steady.
Minuend:	the number from which another will be subtracted.
Movement:	a combination of shape and transition that is performed as one.
Peripheral Vision:	the area of vision lying just outside the line of direct sight.
Product:	a product is the result of multiplying two numbers.
Shape:	a still moment in space and time.
Stick Figure	a stick figure is a sketch of the human body that features all of the major body parts and their location/position in space.



Transition:	a way of getting from one place to the next in space.
Subtrahend:	the number subtracted from another.
Stimulus:	evoking a sense.
Stimuli:	the continual trials of evoking the senses.
Sum:	the result of adding two numbers.